NOVEMBER 7, 1936

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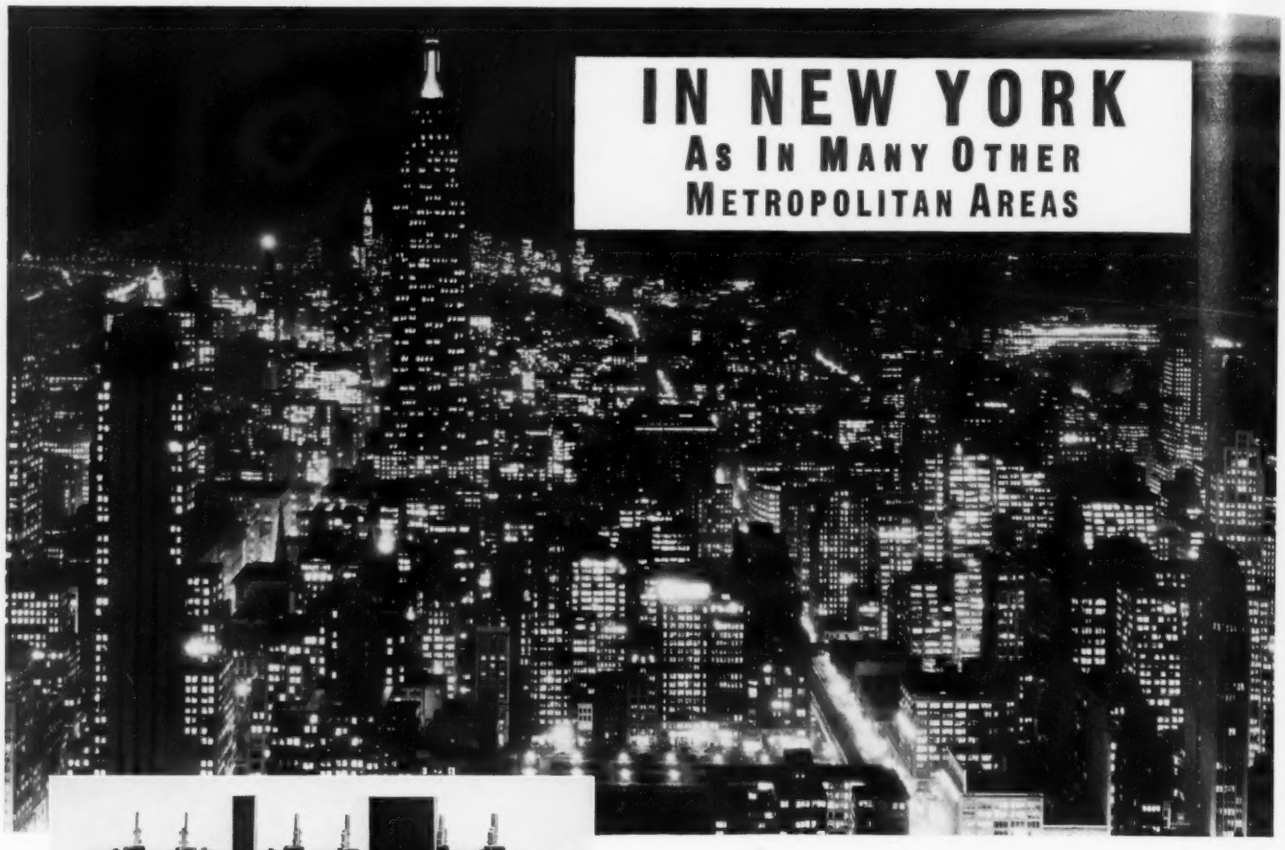

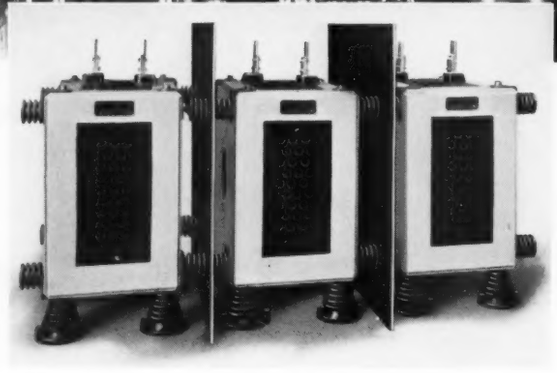

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A pictorial display of the latest line trucks for all duties is to be in a coming issue.

On the Cover

A night view of the New Hampshire State House at Concord.

CONTENTS

NOVEMBER 7, 1936

Rent and Income Fix Appliance Market 39

Oil-Blast Breaker Arcs Photographed 42

Electric Arc Furnace Economical for Small Heats 44

Spar-Arm Pole Top for T.V.A. 154-Kv. Line 46

Socket Meter Conversion Effected at Low Cost 48

A Scientific Poultry Farm 50

Series Capacitor Wipes Out Feeder Flicker 52

Utility Operations Mount 55

Carter Field on Washington Events 58

•

Editorials . . . . . 37 and 56
Operating Practices 70
Industrial Electrification 74
Engineering Ideas 78
Building Up the Load 82
Men of the Industry 86
New Equipment 92
Municipal Items 101
Recent Rate Changes 103
Sales Opportunities 104

NEWS OF THE WEEK

Page 60

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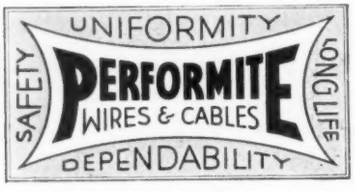

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NOVEMBER 7, 1936

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The Voters Have Spoken

Our democracy has been in its wildest manifestations of political agitation. But now the election tempest has subsided and the majority has thought best to re-elect Franklin D. Roosevelt. The present administration has a ticket to continue its administration of national affairs. The people have spoken.

But what will this re-election mean to the electrical industry? Will the antagonistic attitude toward utilities and large business enterprises be maintained? Will more unfair and drastic legislation be passed? Will a damper be put on business revival? Is this election to be interpreted and acted upon as a public demand that politicians continue along the path followed so far? We doubt it. We believe more sanity will prevail. We believe persecution and crack-brained theory will give way to a desire to continue and encourage the present business upturn.

And the major reason is that the depression psychology has passed. Now business is better and consequently the political attitude is more optimistic and constructive. Also, vital problems will hold political attention—relief, social security, balanced budget, taxation, agriculture. We believe Congress and the administration will assume that existing laws are sufficiently drastic and that present regulation of utilities and business is sufficient. We believe the legislators will reflect the more conservative and saner attitude of the general public and will endeavor to chart a course that leads neither to Fascism nor Communism.

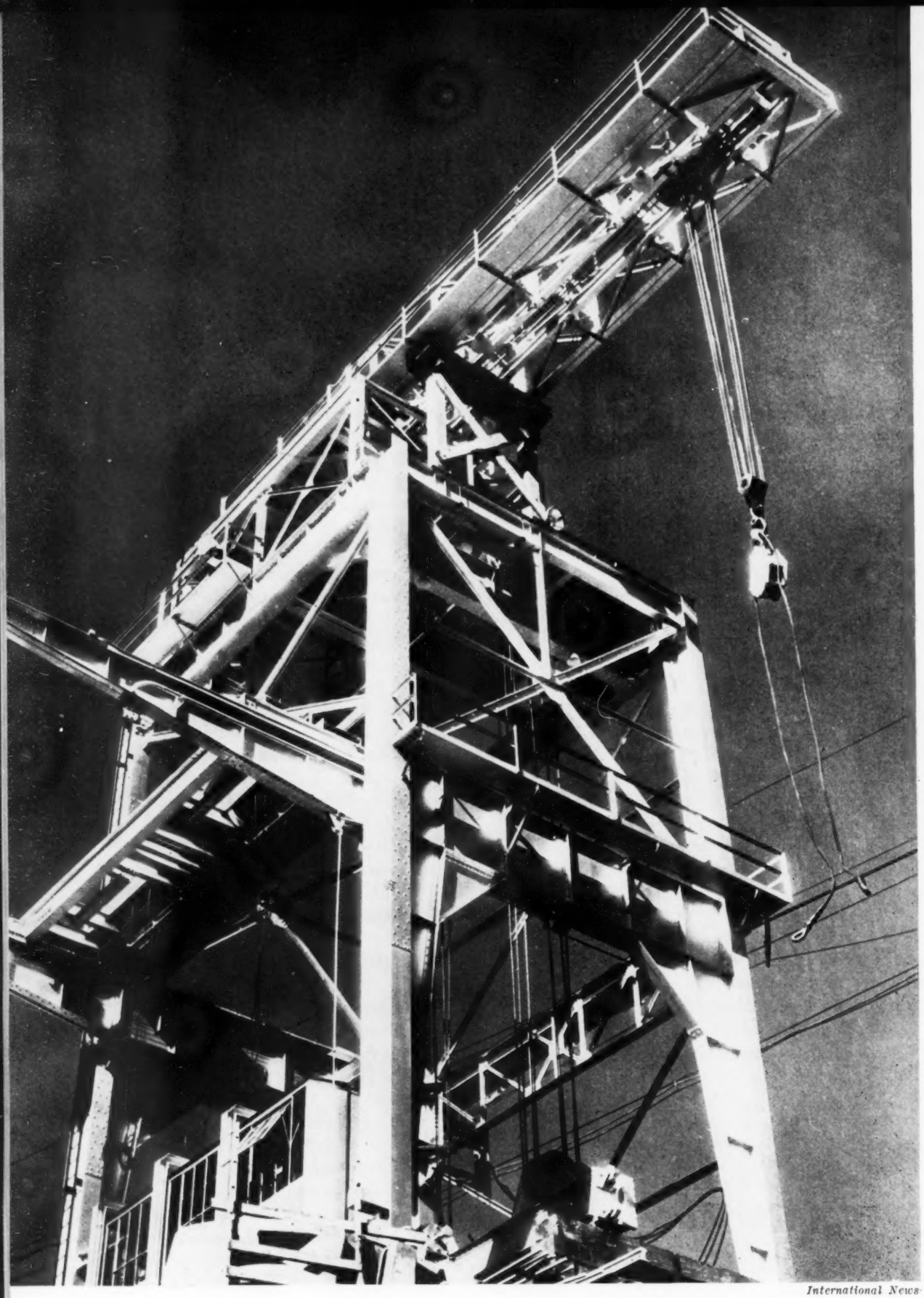
We hope the political skies clear for the electrical industry. No industry is so linked with the comfort and prosperity of the home, farm and factory. None is so vital an agency to bring further recovery and more employment. And the industry is now at work on this program. It has regained its courage and desires to go ahead. What reason could there be for the administration to destroy this possibility and to crush again the optimism of industry leaders? No political gain could be had and no public interest would be served. We don't think the legislators will destroy the most powerful agency for making their plans synchronize with a great upturn in national affairs. We believe that reason will prevail.

If the administration will give encouragement to the electrical industry, the industry will go ahead at full speed and will co-operate with the administration on every project that is founded on sound economics and the public good. The electrical industry has never desired to fight the government. It did so only in self-defense against unfair and vindictive legislation. It is now ready to let bygones be bygones so far as the future is concerned and is willing to trust the courts to rectify the mistakes of the past. Washington has every reason to support and encourage the plus program of the electrical industry. It is deserving and worthy.

Electrical men, however ill-treated they feel and however partisan they have been, are willing to accept the verdict of the public in a constructive mood. The election is over. They now face the future. And they know what they can and should do in their own interest to improve present business and working conditions. They wish to go ahead. They hope the new administration will be equally constructive in attitude and action. If this teamwork is had, then indeed will the industry and the country go forward. We don't see any reason for the administration to maintain its attitude of the past. It will not be so foolish as to destroy when it needs to build.

Sumner Morrow

Editor.



International News

INTAKE GANTRY AT BONNEVILLE DAM

Rent and Income Fix Appliance Markets

Correlation of Several Surveys Shows Consumer Economic Status May Prevent Response to Blind Rate Reduction

By SHERMAN M. HALL

Assistant Engineer Brooklyn Edison Company, Inc.

CAREFUL correlation of surveys shows that the refrigerator market is still far from saturated. Also that future sales efforts should be directed toward selling low- and medium-priced refrigerators to the large middle class. Range effort should follow the parallel line of activity.

The same studies show that basing rate comparisons and costs of residential service upon plant investment, differing costs of construction and of operation leads to incomplete results. Two very important factors are omitted. One is the bearing of consumer income and purchasing power on appliance acquisitions. The other is the effect of housing conditions upon the utilization of appliances, existing and prospective.

Invigorated sales programs are forcing more and more attention upon all the factors that act to prevent mass success. Brooklyn has been making such a study of local and available national data. It shows why cutting the rate fails to induce certain inhibited portions of the consumers to invest in energy-consuming devices. It also shows where the manufacturers have the brightest market outlet among certain brackets.

Rent and income large factors

Consumer purchasing power is most readily measured in terms of annual income or, what is more readily available, rent paid. There is, however, a variable relation between income received and rent paid.

A study of this relation has been made, the data for which were taken from studies and actual field surveys for seven typical cities in seven different states recently made and published by the U. S. Department of Commerce. These cities are San Diego, Calif.; Salt Lake City, Utah; Trenton, N. J.; Columbia, S. C.; Fargo, N. D.; Austin, Tex., and Portland, Maine. Fig. 1 shows a composite cross-section of the income of the people in the seven cities whose appliance ownership characteristics are analyzed here.

The average rent relation for the seven cities combined is shown in Fig. 2. The curve for a large metropolitan city would be found to show a higher ratio of rent and income, and that this relation is not constant, but varies with income. This curve emphasizes this relation, which in many market research surveys, due to inaccessibility of income data, has been assumed to be a constant ratio. Where income data were not available, rent has been used instead, but this curve will permit the conversion of rent into income values if desired.

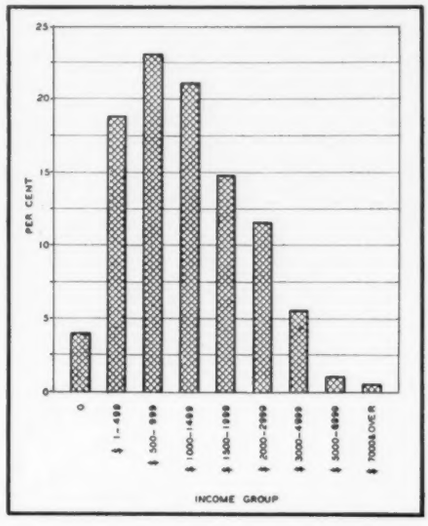


Fig. 1—Seven cities show 44 per cent in $500-$1,500 class

Relation between mechanical refrigerator possession and income is shown in Fig. 3, which is the average of the seven cities. The two income brackets making up the group of from $1,500 to $3,000 income account for 44 per cent of all mechanical refrigerators. This is significant from the marketing point of view in that it shows where the greatest market lies. The great middle class contains the most people and also possesses the most refrigerators.

The percentage of the total people in each group possessing mechanical refrigerators shows the relation more clearly, for there the effect of the total number of people in each group is eliminated. That the per cent of ownership increases as income increases and attains a surprisingly high percentage for the higher brackets is shown by Fig. 4. Although these figures show a commendable degree of saturation, they also indicate that the market for refrigerators is by no means saturated, and that manufacturers and merchandisers should concentrate on lower-priced equipment to reach the great medium and lower income brackets. The seven cities from which these saturation figures are compiled are not of the metropolitan type; that is, the predominant type of house is of one- or two-family construction. In apartment house quar-

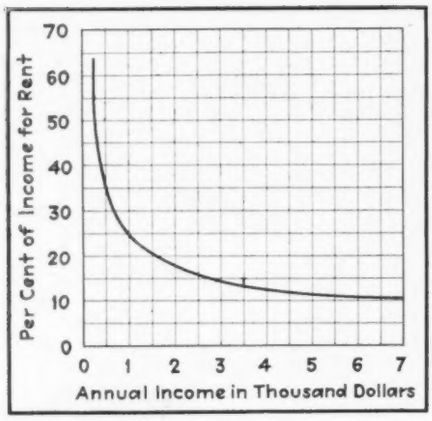


Fig. 2—Rent expenditure varies exponentially with income

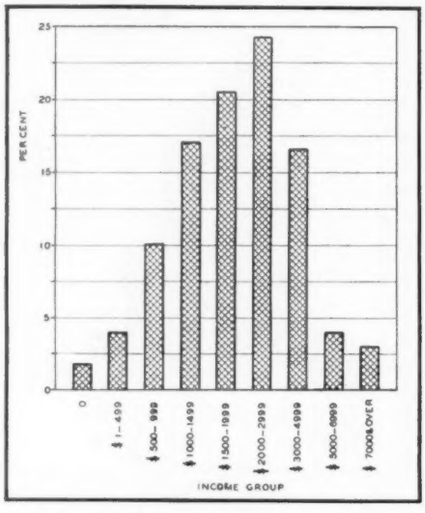


Fig. 3—Refrigerators are 44 per cent in the $1,500-$3,000 class

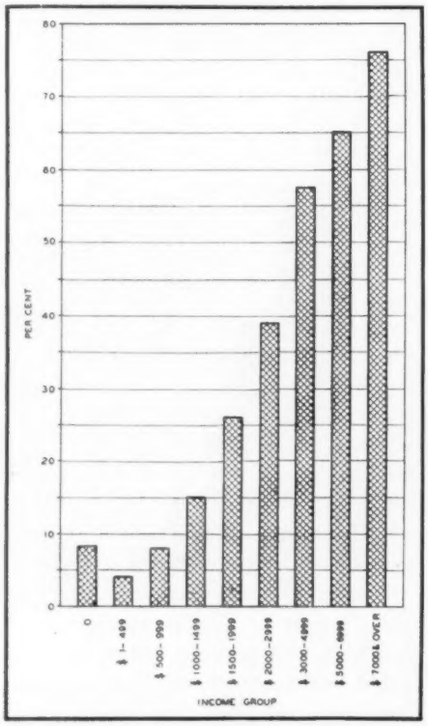


Fig. 4—Refrigerator saturation goes up with income

ters refrigerator saturation is found to be higher.

Moderate income brackets have ranges

Relation between electric range ownership and income is shown in Figs. 5 and 6. These graphs are based on data for two cities where there was a sufficient number to permit conclusions to be drawn. Fig. 5 shows the distribution of the total number of ranges among income groups. Although a range, with its necessary special wiring, represents the consumer's highest investment in a single appliance, 61 per cent of all ranges in the cities analyzed here are owned by consumers with annual income below $2,000. Going down still farther in the income scale, 22 per cent of all the ranges are owned by those with less than $1,000 annual income. The proportion of consumers in each income group who own ranges, disregarding the total number in that particular income class, appears in Fig. 6. With the breakdown of income groups available here, the class with $3,000 to $5,000 income is the highest in saturation.

The same relation between income or rent paid and the ownership of ranges and refrigerators, either representing a substantial investment for the consumer, holds for smaller and less costly appliances also. In Fig. 7 this relation is shown for a large metropolitan city for radio sets, vacuum cleaners and refrigerators. Although radio sets show a generally high saturation and cover a wide price range so as to be available to almost any pocketbook, the relation still holds that the higher the income the higher the saturation. It is interesting to note that in this case vacuum cleaner saturation is proportional to rent.

In 1932 the magazine *Time* conducted and published a market survey taken for the city of Appleton, Wis., which included electric appliances. Results of this survey in the relation of income and the possession of smaller appliances are given in Fig. 8—*viz.*, toasters, washing machines, ironers, heaters and percolators.

The most interesting information revealed by this survey is the relation between kilowatt-hour consumption per family and annual income (Fig. 9). In general, consumption increases with income. The group receiving

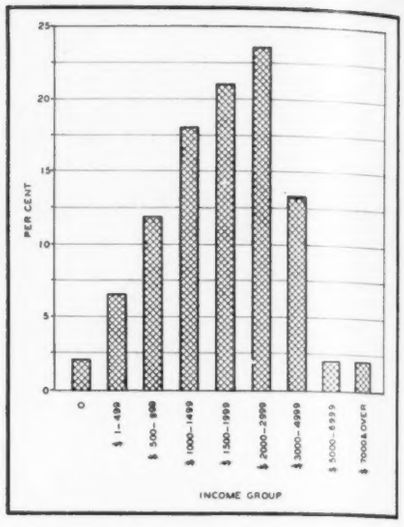


Fig. 5—Ranges most prevalent among middle income group

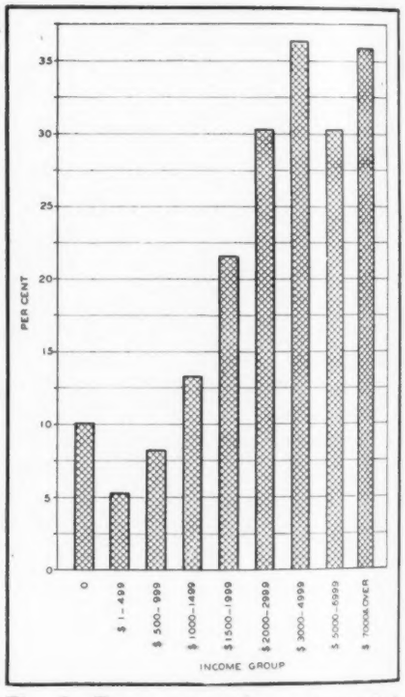


Fig. 6—Range saturation not greatest among well-to-do

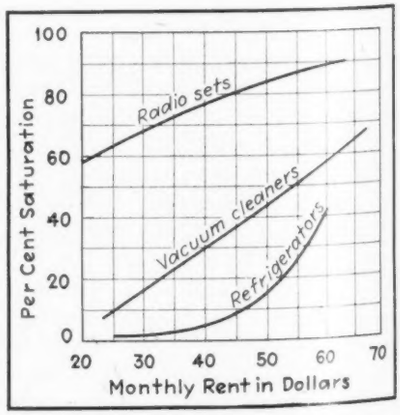


Fig. 7—More rent, more appliances, especially refrigerators

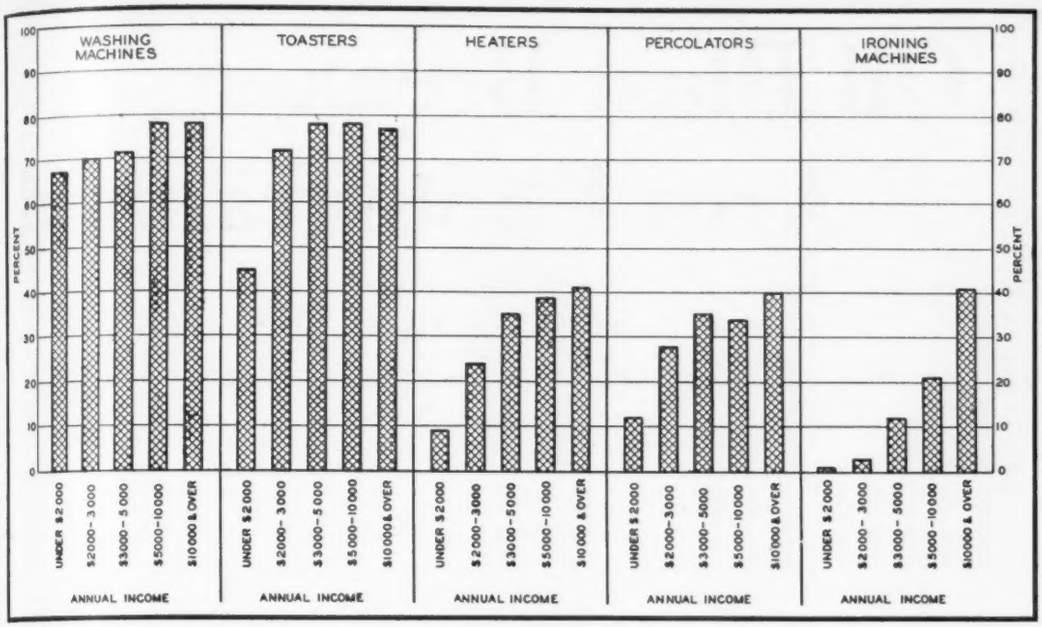


Fig. 8—Low income groups have washers and toasters
Heaters, percolators and ironers more responsive to purchasing power. Data from *Time* survey.

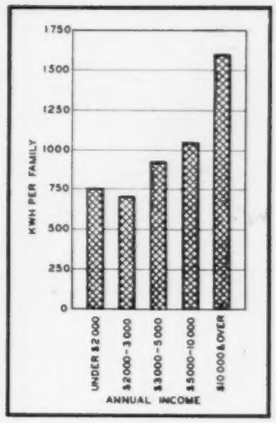


Fig. 9—Comfortable families use the kilowatt-hours

$10,000 and over consumes 50 per cent more than the next highest group of $5,000-$10,000.

There are other factors than income which have an important effect on residential energy consumption and the next in importance is housing.

For example, take two typical families having identical incomes, one living in New York City, the other in, say, Salt Lake City. These two widely separated families could hardly be expected to consume an equal amount of electricity due to their housing conditions. The New York family would no doubt occupy a three-room apartment, using an electric refrigerator, lighting and a few small appliances. They would have no room for a washing machine, ironing machine, water heater, and, as they would be renting their quarters, would have to depend on the landlord's generosity as to an electric range. And believe it or not, the chances are against the ownership of even a vacuum cleaner. Having but three rooms, one a bedroom seldom illuminated, a kitchen lighted only during preparation of meals, only the living room would be lighted to any great extent. That lighting energy use varies with the number of rooms requires little proof, for many rates have been approved by public service commissions which contain demand charges, based on number of rooms, or size of house.

The Salt Lake City family probably would have a six-room house. Lack of space would not limit its possession of appliances. According to appliance statistics, this family would undoubtedly have a range, refrigerator, washing machine, ironing machine and possibly a water heater. With ample kitchen space it would be more likely to own the various small kitchen appliances such as mixers, beaters, etc.

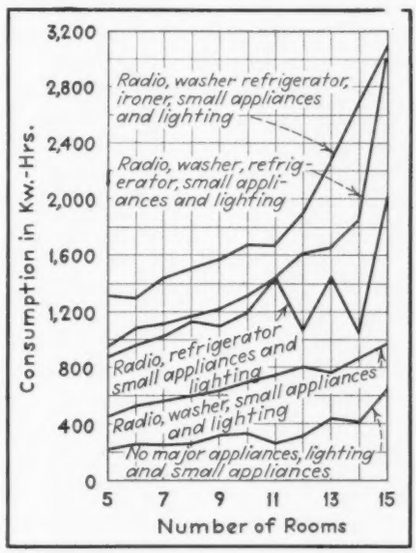

Consumption in Kw.-Hrs.
Number of Rooms
Radio, washer refrigerator, ironer, small appliances and lighting
Radio, washer, refrigerator, small appliances and lighting
Radio, refrigerator small appliances and lighting
Radio, washer, small appliances and lighting
No major appliances, lighting and small appliances

Fig. 10—Energy consumption increases with rooms at approximately the same rate for large or small users

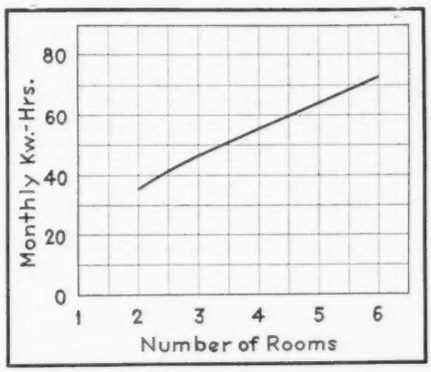


Fig. 11—Usage rises with rooms in multi-family housing

Relation between energy consumption and number of rooms is shown clearly in Fig. 10. These curves are based on an actual survey made by the West Penn Power Company.* Each curve represents a group with the same number and type of appliances. In every case the use of electricity increased with the number of rooms. It is interesting to observe, also, that the rate of increase is approximately the same for the minimum consumption group as it is for the maximum group. Although the effect of purchasing power cannot be eliminated from these curves, still purchasing power as revealed by appliance ownership is the same on any one curve.

The same relation between number of rooms per family quarter and energy consumption holds for apartments in a large metropolitan city (Fig. 11), the values being based on actual records and a field survey of more than 3,000 apartments. Energy consumption as shown here is practically proportional to the number of rooms.

*Electric Light & Power, March, 1934.

Breaker has plate glass sides for arc observation

Oil Blast Breaker Arcs Photographed

Twenty Views per Cycle Shows Removal of Arc Products and the Velocity Attained by Oil Wedge in Interruption

By L. S. HOBSON

Managing Engineer Small Oil Circuit Breaker Division, General Electric Company, Philadelphia, Pa.

OBSERVATION by means of high-speed photography of the various phases of arc interruptions in oil has proved very useful in substantiating previous theories advanced determining the most efficient designs, proportions, etc., and in general clarifying the theoretical picture of what goes on inside an oil circuit breaker when it interrupts current. The accompanying illustrations have been chosen from films of three tests on two designs of oil blast structures, and for comparison on a plain-break construction. The same breaker structure, frame, tank, etc., were used for all of these tests. The only change was in contact and oil baffle arrangement. The construction is shown by the sketches at the top of Figs. 1, 2 and 3, which are drawn to the same scale as the pictures, so that location of ports, etc., in the pictures can be determined by comparison with the sketches.

The pictures were taken at a rate of approximately 1,200 exposures per second, or ten exposures per half cycle. The oil blast breaker used in the tests was not a regular production design, but was constructed with an arrangement of oil blast parts to facilitate photography. The breaker was single pole with a tank having heavy plate glass sides and the tank lining was made of a transparent, arc-resisting insulating material. Lights on the side of the breaker opposite the camera supplied the illumination, supplemented by the light from the two arcs. A time record on the film made possible accurate matching of the pictures and oscillograph records.

In studying these pictures it should be borne in mind that the entire action takes place under oil. The "arcs" visible are made up of a body of incandescent gas (usually called a gas bubble) caused by the heat breaking down a very small quantity of oil. These gas bubbles are partially or completely surrounded by a film of carbonized oil, which shows up in the pictures as gray or black bodies against the white background of the floodlights showing through the clear oil. These black bodies are not solid black oil, but are simply black carbonized oil envelopes inclosing the gas bubble and the arc. Other black bodies shown do represent solid carbonized oil. It is the increasing size of these gas bubbles that generates pressure in breakers. It should also be noted that the glaring white spots which are encircled by the black, carbonized envelopes are due to the intense heat burning through the envelope, the amount of "glare" as shown by the halation giving some indication of the current intensity.

One baffle is ported

The short section of film shown in Fig. 1-A covers a time interval of 0.009 second during the period of interruption of a current of 490 amp., 6,000 volts normal and with a recovery rate of 196 volts per microsecond. The contact design in this test was that shown in the sketch at the top of Fig. 1. The baffle on the left is solid, the one on the right has an exhaust port or outlet adjacent to the contact. The oil level is just above the top baffle, well above the contacts.

In frame 1, Fig. 1-A, the gas bubble on the right within the interrupting chamber is considerably smaller than the one on the left, and yet approximately the same amount of gas has been generated at each arc. Some portion of the gas generated by the right arc has been forced out the port at the right and up the exhaust flue, rising to the top of the oil. The incandescent gas outside the port in frame 1 (likewise in frames 2 to 5) is being carried away from the path of the arc, by the pressure exerted by the left arc. The vigorous movement to the right and through the port is shown by the stationary position of the pressure generating gas bubble around the left contact and the rapid passage of the right gas bubble, arc products and oil through the port on the right. A view of the motion picture from which these frames are taken very materially adds to the effectiveness with which this action is demonstrated.

Between frames 4 and 5 the inside boundary of the right gas bubble has moved on a considerable distance across the contact. The fact that this movement has taken place in 0.0008 second indicates a very high oil velocity. Frame 5 shows conditions just before current zero. The reduction in halation indicates a less intense arc.

Frame 6 is approximately current zero. The appearance around the right contact indicates that the gas bubble has collapsed, and only a part of the collapsed film of carbonized oil, acting very much as the rubber film of a toy balloon which has suddenly collapsed, can be seen within the interrupting chamber of the breaker. It should be borne in mind that the slight carbonization of oil which makes it appear black in the photographs does not appreciably reduce its ability to interrupt an arc. The slightly carbonized oil from the film of the collapsed gas bubble plus the clean oil which is next to it, but which

becomes partially carbonized due to the general turbulence, therefore supplies the necessary insulation between the right contacts, prevents the recovery voltage from reigniting the arc and has therefore interrupted the circuit at frame 6.

Entire interruption recorded

Fig. 1 shows a résumé of the complete interruption in the same test. Space will not permit showing the entire film and pictures have been cut from it at approximately every ¼ cycle, at current peaks and zeros. The time interval is therefore increased from 0.0008 second between exposures to approximately 0.0004 second. Arcing started just prior to the first current peak (shown in Fig. 1, frame 1). The instant of this exposure may be located on the oscillogram of the same test (Fig. 1-B) as the third current peak before arc extinction. The peak is negative (below the zero line). Frame 2 shows conditions at current zero, ¼ cycle after frame 1. The oil blast action forcing the right gas bubble out of the port is evident. Frame 3 shows current maximum again and on the oscillogram is the last positive current peak (above the zero line) before arc extinction. The next current zero, frame 4, is the last prior to arc extinction. It is interesting to note that the circuit was not interrupted at frame 4, due, of course, to the amount of hot gas easily visible between the contacts on both the left and right sides.

The last three frames, 5, 6 and 7, show, respectively, the last current peak, interruption and a short time interval after interruption. These three frames are the same as frames 1, 6 and 11 shown under Fig. 1-A.

The sketch at the top of Fig. 2 shows another arrangement of oil blast baffles with butt-type contacts and the exhaust port on the left. In this test the current was 580 amp., 6,000 volts normal, and the recovery rate 220 volts per microsecond. Frame 1 shows the first current zero just as the con-

[*Continued on page 98*]

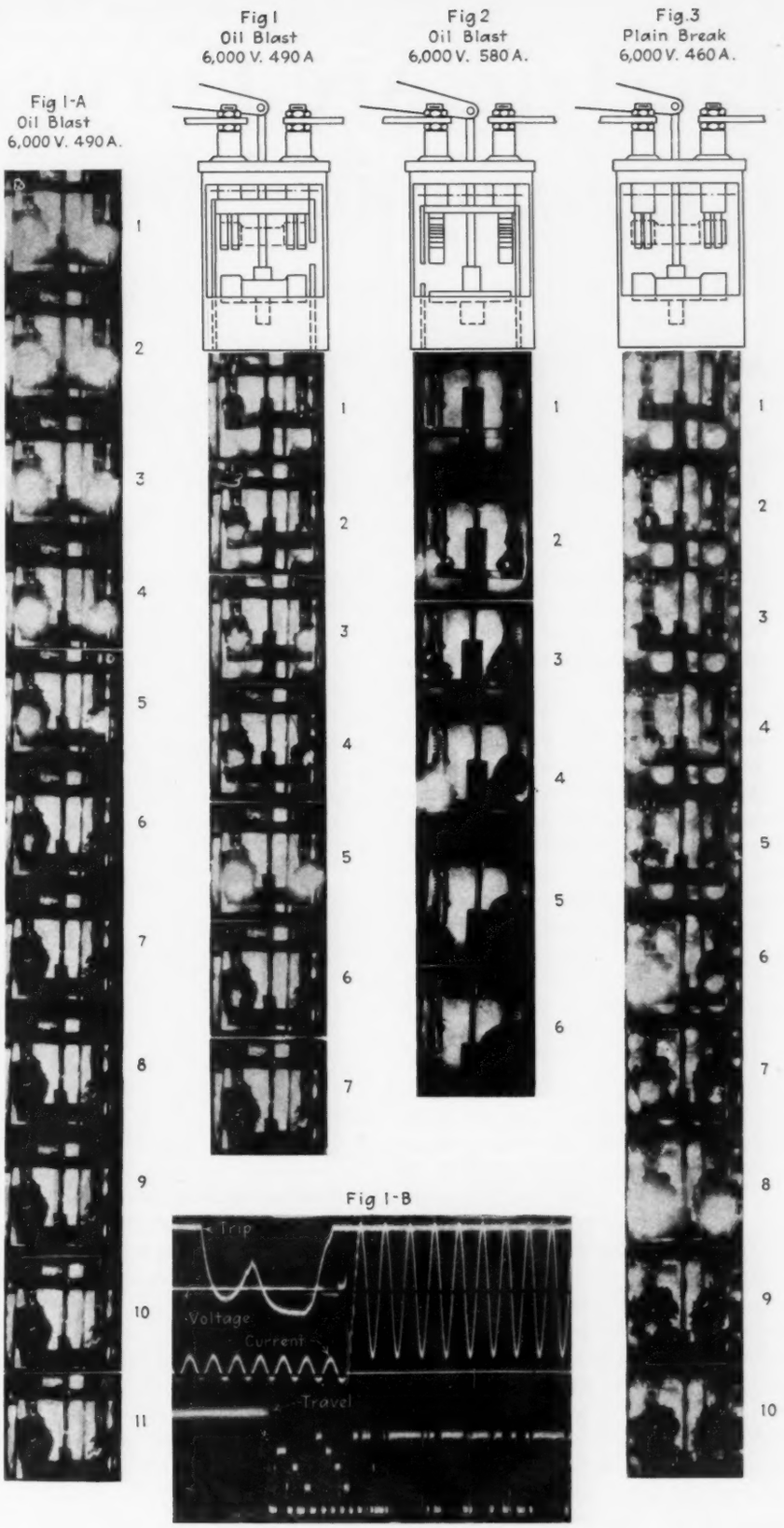


Fig. 1-A—Oil blast breaker phenomena at 1,200 views per second

Circuit, 6,000 volts, 490 amp. Pressure forming arc at left; port at right.

1—Maximum current.

2-5—Gradual decrease in right gas bubble. Gas and oil forced through port.

6—Zero of current wave circuit interruption.

7-11—Action after interruption. Continued oil movement through port.

Fig. 1—Oil blast arcs pictured at quarter cycle intervals

Circuit, 6,000 volts, 490 amp. Pressure forming arc at left; port at right.

1—Maximum of current wave. Contacts open a short distance.

2, 3, 4, 5—Successively zero, maximum, zero and maximum of current wave. Oil and gas forced through port.

6—Zero of current wave. Circuit interruption. Same picture as 6 of Fig. 1-A.

Fig. 2—Oil blast baffles with butt contacts

Circuit, 6,000 volts, 580 amp. Successive pictures 1/240 second (¼ cycle) apart. Pressure forming arc at right; port at left.

1—Zero of current wave. Contacts just parted.

2, 3, 4—Successively maximum, zero and maximum of current wave. Oil and gas forced through port.

5—Zero of current wave. Circuit interruption.

Fig. 3—Conventional arrangement without baffles

Circuit, 6,000 volts, 460 amp. Successive pictures 1/240 second (¼ cycle) apart. Plain break breaker. No oil blast.

1—Zero of current wave. Contacts just parting.

2, 3, 4, 5, 6, 7, 8—Successively maximum, zero, maximum, etc., of current wave. Shows general turbulence without any directed movement of oil between contacts.

9—Zero of current wave. Circuit interruption. Note the increased number of cycles required for circuit interruption as compared to Figs. 1, 1-A and 2.

Fig. 1-B—Oscillogram of oil blast arc phenomena

Electric Arc Furnace Economical for Small Heats

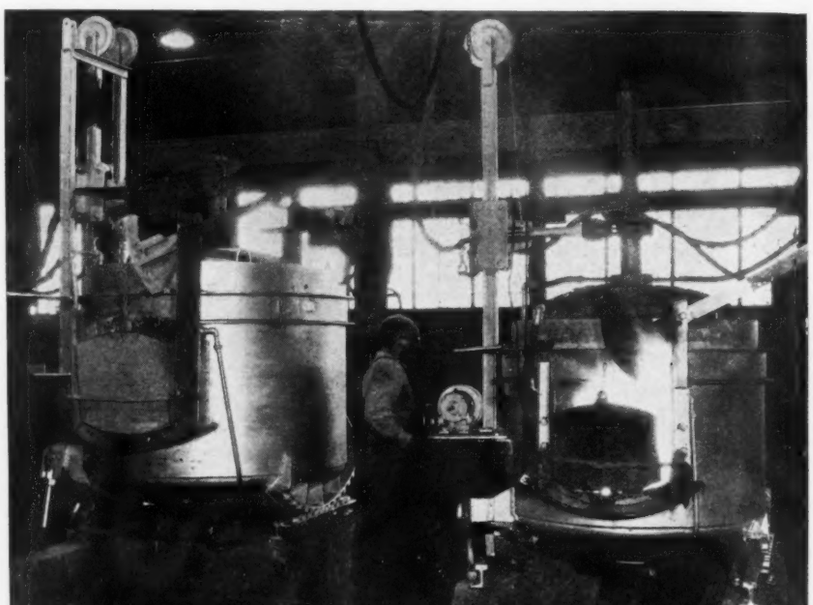
Experimental Installation Shows Competitive Costs With Cupola Melting, a High Load Factor, a Superior Product and Ability to Make Quick Delivery

By ALBERT E. GREENE
Manager Greene Electric Furnace Company, Seattle, Wash.

BUSINESS conditions during the past five years forced a critical analysis of practically all operations to obtain greater economy. Foundries, particularly, found it difficult to reconcile the infrequent cupola heats justified by the available volume of business with the need for making quick deliveries of castings necessary to retain their customer's business. The problem was to conserve both the cupola heat for efficient heating and the customer's good will. Furthermore, heats were small, often as little as two tons, contributing to the inefficiency of metal melting in cupolas designed for larger charges. Under these conditions coke consumption was high, the bed charge exorbitant and labor costs excessive because the bed and breast of the cupola had to be renewed after each pour. At times it was difficult to collect sufficient work for a heat without undue delay in deliveries.

To remedy this situation small electric furnaces were suggested as a means of obtaining operation economy. An experimental single-phase electrode arc-melting furnace was installed in the Olympic Foundry Company, Seattle, Wash., to determine whether or not electric metal melting could be carried on more profitably therein than in a cupola.

Obviously the first essential was to try to balance the cost of electric power and electrodes against coke as a source of heat. At first this seemed out of the question, because, to be competitive, the amount of energy necessary to melt a ton of cast iron would have to cost less than $2.50. In the cupola the cost of coke per ton of iron melted is approximately $2 per ton. In terms of kilowatt-hours small arc-melting furnaces charged with 1,000 lb. of metal and operating at the 100-kw. demand consume more than 600 kw.-hr. per ton of iron melted. On this basis electric energy, to be competitive with coke, would have to be obtained for approximately 3 mills per kilowatt-hour. The cost of electrodes is a comparatively minor item, about 1½ lb. of graphic elctrode material being used per ton of iron melted. This item amounts to approximately 30 cents per ton.



Two single-phase electric arc furnaces installed at Olympic Foundry, Seattle, Wash., provide more economical operation, a superior product and quick delivery on small orders for castings. Electrically their operating characteristics prove them to be a desirable load

The rate necessary having been thus determined, a contract was obtained from the local utility for stock or seasonal power at a rate said to average under 4 mills per kilowatt-hour. This seasonal rate justified the installation of a trial unit and a furnace was loaned to the foundry for that purpose. Preliminary experimentation resulted in the installation of a 48-in. diameter shell furnace, shown at the right-hand side in the accompanying illustration. This furnace required approximately 100 kw. demand for a normal heat of 1,000 lb. of metal, but

larger heats up to 1 ton were made on various occasions.

It was anticipated that this furnace would permit small heats to be made at regular intervals and improve the delivery schedule of the foundry. This proved to be the case, and it is now common practice to have patterns come to the foundry in the late afternoon and deliver the castings the following morning.

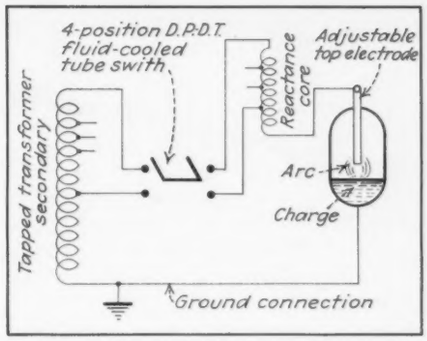
Half million kw.-hr. in a year

As business gradually increased and experience was obtained with the new furnace it was kept running for longer periods per day, and very soon after its installation operated on a 24-hour schedule every weekday. Operating on only a 100-kw. demand the furnace often consumed well over 50,000 kw.-hr. per month. Production with this energy consumption was approximately 70 tons of iron per month.

Experience in handling the heat resulted in gradual improvement both in the qualities of products and the operating technique. Among the early troubles were hard spots in machined castings. Analysis showed these hard spots to be due to low carbon pellets which had not been melted and alloyed with the iron. Hurried melting was one cause of this trouble, and it was aggravated by the use of miscellaneous scrap iron and steel. With proper attention this trouble can be entirely eliminated. Infrequently spongy castings appeared, the exact cause of which was not known, but a remedy was found by applying slags similar to Greene slag used for making steel, indicating that the cause of sponginess was oxidation. The furnace also proved satisfactory for making special alloy and heat-resisting cast iron, and as a result of the installation the business in special iron at this concern has increased considerably.

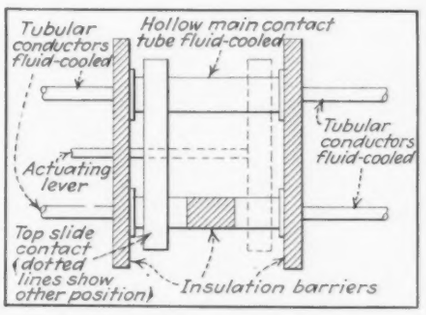
It has been definitely determined that cast iron equal to or better than the best cupola cast iron can be made in this electric arc furnace with a charge costing less than that used in the cupola. Electric power, therefore, can be considered, even though the cost of electric energy and electrodes exceeds the cost of coke.

About a year ago the demands on this furnace had increased and power was increased to 200 kw. With this higher demand and consequent faster melting the energy consumption per ton of iron melted dropped to approximately 500 kw.-hr. per ton and as much as 180 tons have been poured from this installation per month. Faster melting has proved the economy of the electric arc furnace in that doubling the demand more than doubles the output of metal and saves possibly 150 kw.-hr. per ton of metal melted. Quicker melting time with less heat loss accounts for the saving.



Secondary wiring and switch connections as used on the single-phase Greene furnace

Several factors contribute to the economy of operation, the good quality of the product and the low first cost of these electric arc furnace installations. The furnace equipment is single phase and takes current at the standard low voltage of approximately 260. The equipment includes voltage and reactance equipment and switches, together with an automatic d.c. electrode control motor. Heretofore single-phase furnace loads have been considered objectionable by power companies. Experience with this installation has proved that the load causes no undue system disturbances provided ample capacity is provided in the transformer and in the power load through the installation. By providing a suitable variable reactance it is possible to start the furnace with ample reactance to steady the surges and, after the arcing electrode has melted down through the charge and formed a bath, the arc can be kept steady with very little reactance, thereby enabling the operation to proceed at a better power factor. In connection with the latter, power factors of 80 per cent or higher are common. The unsteady part of the heat is during the first quarter hour or so, but the balance of heat can be obtained with a steady energy flow at a high power factor.



Fluid-cooled tube switch permits use of standard transformers

Provides an inexpensive means of controlling the heavy current inherent to low-voltage, high-demand energy required for electric furnace operation.

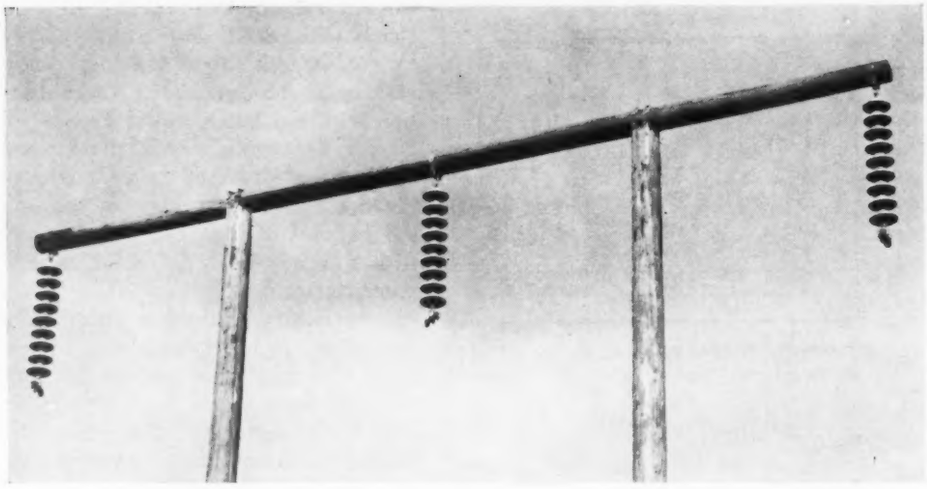
Contributing to the low installation cost is the fact that switching equipment of a new type permits the furnace to be operated entirely off the secondary side of the transformer, obviating the use of special power transformers having taps on the primary side. Such transformers are expensive, both because of their special design and because the cost of tap-changing switches increases rapidly as the voltage increases. Furthermore, equipment of this type ordinarily must be placed in a transformer vault. With the new secondary switching arrangement used on the installation described herein outdoor type transformers are preferred, thus saving the cost of a transformer room. A standard power transformer providing a normal secondary voltage is sufficient. An inexpensive auto-transformer with a set of variable voltage taps and used in conjunction with a dry type reactor also equipped with variable taps is all that is necessary to provide a wide range of single-phase arc furnace operation.

Water-cooled switch devised

To obtain variation of voltage and reactance a new type of water-cooled tube switch is provided. These switches, illustrated in the accompanying diagram, consist of hollow metal structures insulated by inserting hollow sections of insulating tubing of the same diameter so as to form a continuous tube through which oil or distilled water is pumped. A metal connecting link slides along the tubular conductors, making contact between the terminals of the various circuits in its various positions. Because of the simple motion of the switch and because the contacts are externally cooled these switches are able to carry very high current densities without damage. Various combinations of switches permit selection of desired taps on the auto-transformer and reactance.

It is recommended that a high voltage be used for operation at the start

[*Continued on page 99*]



Ready for stringing conductors. The only climbing required up to this point has been to remove the cable and guy ropes used in raising the assembled structure

By

LLEWELLYN EVANS
Chief Electrical Engineer

and

H. C. DANIELS
Electrical Engineer

Tennessee Valley Authority

Spar-Arm Pole Top for T.V.A. 154-Kv Line

Mechanical and Electrical Problems Solved by Unique Design Involving All-Wood Construction With Round Spar Cross-Member

ATTACHMENT of round spars to the pole tops of the Wilson Dam-Norris Dam 154-kv. transmission line described in an earlier article presented a mechanical problem different from that in conventional crossarm construction. Also, to prevent burning of wood members by leakage and charging currents, a large area of high-pressure contact between wood and metal was necessary at each point of connection. These considerations indicated the use of some form of pole band. In order to keep the number of items of hardware as small as possible, it was desired to use the same fittings, if practicable, on all types of structures.

To be applicable to all structures, the bands must have great strength for the dead-end structures and be adjustable over a wide range of circumferences of structure members, all of which are round. The ears or lugs of the ordinary pole band by which it is drawn tight were found to be weak points. This point of weakness was overcome by bending the end of the lug back on itself and welding it to the circular part of the band (see Fig. 2).

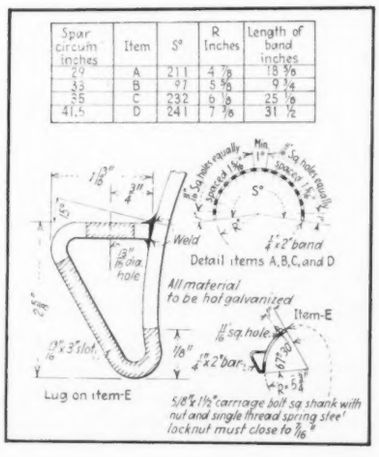


Fig. 2—Pole band ear reinforced

The necessary adjustment was provided by making the lug ends short and by using straps of various lengths and radii for joining them to form bands of any desired length and radius. These straps are made with 11/16-in. square holes on 1 5/16-in. centers to provide for adjustment and connections to the lug ends with 5/8 x 1½-in. square shank carriage bolts. All parts of the band are made of ¼ x 2-in. steel bar and four lengths of strap provide sufficient range of sizes for all connections and attachments on nominal circumferences from 29 to 41.5-in.

The round spar crossarms are mounted directly on top of the poles and 2x2x5/16-in. angles bolted vertically to the pole tops provide attachments by which the bands can be drawn tight. The bands are tightened up by means of 5/8-in. machine bolts bent at right angles near the head rather than by J-bolts, which might straighten out and release the crossarm under heavy load. Complete assembly of a pole top on an H-frame suspension structure is in Fig. 3.

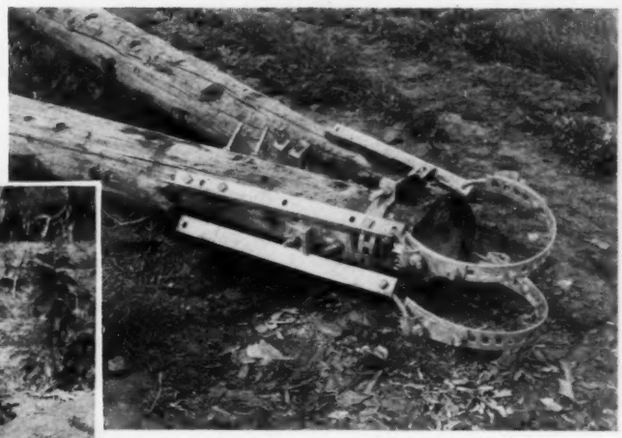
Overturn shear resisted

At the top of the A-frame dead-end structures very high shearing strength is required to resist overturning moments. Fig. 4 shows the assembled connection of the two poles of an A-frame as designed to provide the necessary strength. The shearing stress in the poles is distributed by insertion of two 4-in. steel timber rings extending ½ in. into each pole and held tight by ¾-in. bolts through their centers. In addition a band is placed around the tops of the two poles. Bands for holding the crossarms in place are attached in the same

[*Continued on page 100*]

Fig. 3—Round spar for crossarm on H-frame

Two special adjustable pole bands. Angles are anchorage to draw bands tight by machine bolts bent at right angles near head. Pole top covered with thin sheet of copper before hardware is attached. Ground wire pole in background.



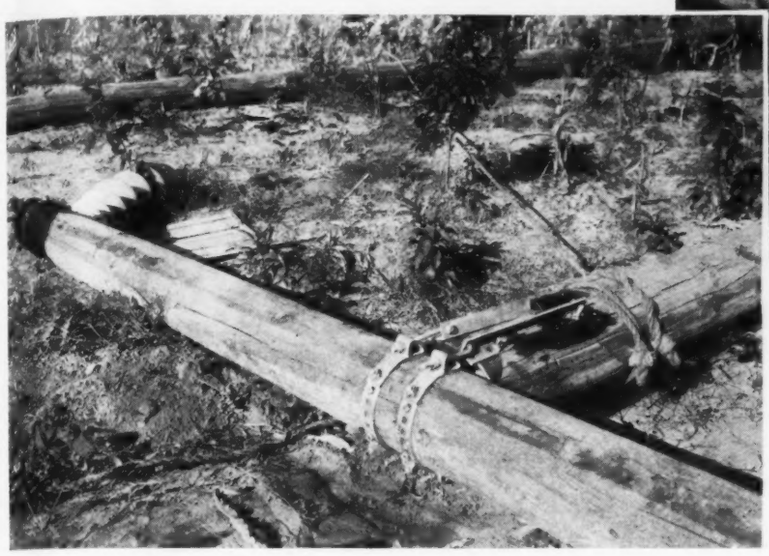


Fig. 4—A-frame for round spar construction

Bolts through timber rings distribute shearing stress caused by overturning moment. Top band prevents loss of effective shearing strength of timber rings which would result from pulling apart of pole tops. Natural "V" formed by pole tops provides firm seat for spar crossarm.

Fig. 5—A-frame suspension dead-end

In earlier article, "T.V.A. Chooses Wood in a Lightning Area" (ELECTRICAL WORLD, April 11, 1935), the authors showed the basis for adopting an H-frame wood-pole structure with round spar crossarms. Details of that construction were omitted there and they are supplied here. They show how A-frames were designed to provide the necessary strength (without the use of side guys) and also maintain flashover insulation between conductors and ground at dead-end structure equal to that for the H-frame suspension structures.

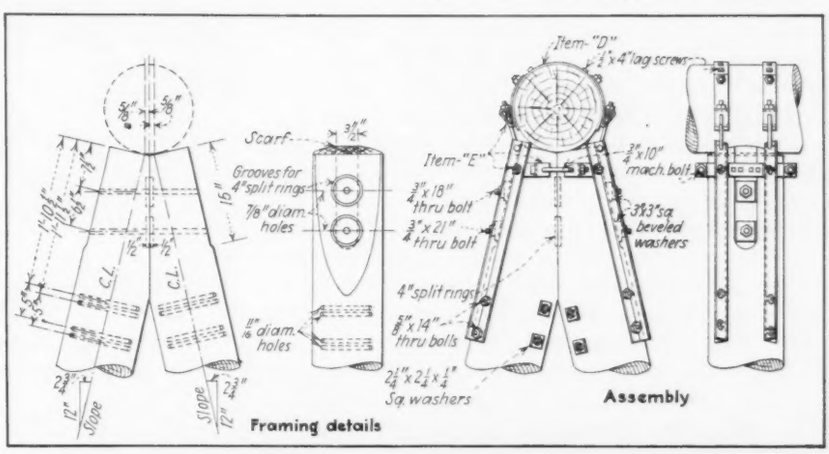


Fig. 6—Anchor logs resist overturning uplift

Fig. 7—H-frame ready to raise

Raised easily with tractor and gin pole and steadied by guy ropes. Hardware admirably suited to such handling.

Socket Meter Conversions Effected at Low Cost

Special Jig, Systematic Program, and Neat, Orderly Arrangement of Parts Simplify Adaptation of Older Meters to New Sequence — Helpful Shop Practice "Kinks"

By E. J. SINGREY

Meter Department, Northwestern Electric Company, Portland, Ore.

IN CONVERTING the I-14 and I-16 meters to the new socket type the Northwestern Electric Company has found that the manufacturers' instructions, as shipped with the conversion kits, could be changed in certain cases to simplify the process, saving time and material thereby. Every conversion program will benefit from a definite production plan. It was obvious that to dismantle, cut off the casting and rebuild one meter at a time would be wasteful of time and energy. It was decided, therefore, that twenty meters could economically be put through at once, the number that one man can easily complete in two days.

Meters first are cleaned of excessive dirt and set out on a bench, where the company and manufacturers' numbers are recorded on a suitable form. The covers then are removed. On metal-covered meters this is rapidly effected by the use of small bolt cutters, the wing nuts being easily removed in this way without loosening.

The cardboard boxes in which the conversion kits are shipped are very useful as containers for the parts of the knocked-down meter. Cutting in half the cardboard packing fused inside the box to protect the glass cover and turning it on edge provides a handy shelf for the meter register and disk, these parts being delicate enough to deserve special attention. Damping magnets are placed in the bottom at the back of the box, where they do not accumulate lathe cuttings and other foreign matter. Nameplates and other small items are placed in the cover.

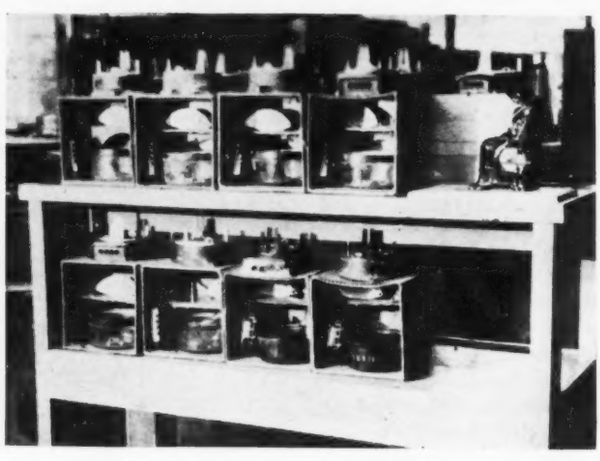


Fig. 1—Old meters are disassembled, the parts being packed in the boxes containing the conversion kit

In removing nameplates a cold chisel, ground square across at the end, is a useful tool which, placed at the side or end of the nameplate, removes them readily. It is also used to remove cover studs, employing a shearing rather than cutting effect.

Unnecessary to disturb lag

With this technique it is unnecessary to remove or disturb the adjustment of the lag plates in the meters. This is believed to be an improvement over the prescribed method as it saves time in calibrating as well as dismantling and rebuilding. As the meters are torn down, the parts are put in these containers and placed upon the small hand truck as shown in Fig. 1, where all parts are accessible for such work as is necessary to be done to them, without mixing them up or causing needless handling.

In the next step of the process the grid is cut from the base of the meter. For this purpose this department has found the lathe superior to other methods, primarily because it eliminates the necessity for removing the light load mechanism. Cutting takes place on that part of the casting which is of circular shape.

To hold the bases during the turning operation an arbor was designed, being essentially a faceplate with a cavity bored out at its center to allow space for the lag plate of the meter. The back of the device is turned down to form a heavy spindle by which the device is gripped in the lathe chuck. Five small pins are screwed through the flange from the back and allowed to project about $\frac{1}{4}$ in. in the front as shown in Fig. 2. These five pins are so placed as to engage convenient screw holes in the backs of either I-14

or I-16 castings. Castings are held down securely by the large wingnut while they are being cut off.

Operation performed on lathe

The casting mounted in the lathe with back cut off is shown in Fig. 3. The compound slide is set at 30 deg. and a special spring tool holder is used to prevent excessive vibration. As may be seen from the illustrations, the arbor is so designed as to prevent parts of the casting from becoming damaged as they are separated. Neither can they foul the lathe or injure the operator. If so desired, the piece may be smoothed off in the back by the use of a large file while the lathe is still running. However, the use of a large wire brush or buffer mounted on a grinding stand is preferable. It is possible to cut off and finish twenty grids in about 45 minutes in this way.

Next operation is the preparation of the nameplates on the I-14 meters. The operation of drilling and tapping the magnet shelves for No. 2-56 screws has been discarded and with it the broken taps and drills that are so hard to remove. Instead, the bars from the two-wire meter are bent into a bracket, one end of which is soldered to the back of the nameplate. The nameplate has previously been ground round at the bottom corners and polished on a small buffer. The other end forms an eye which is placed under the first magnet-holding screw.

The nameplate occupies a slightly lower position than was intended,

Fig. 2—Special arbor developed to simplify cutting the grids from the old case on a lathe

but it is held securely in place. Soldering can be done with the aid of a small jig in very little time. Edges of castings which have been machined are painted to prevent rust.

Small parts arranged orderly

In the final reassembly of the meters special attention has been given to the orderly disposal of various screws, washers and accessories by providing small bins, into which they are placed as they are removed from the cloth bags. This is essential in producing uniform workmanship as well as giving the workman an opportunity to concentrate more effectively on increasing personal efficiency.

The parts of the dismantled meters are arranged in their boxes on the shelves above the bench (see Fig. 4). Mousing wire is drawn directly from a spool through screw eyes to the point where it is convenient for use in extending the current leads, making this item always available and still out of the way when not needed. To facilitate attaching and soldering these leads a stand has been devised from a 1½-in. "a" condulet, a short nipple and a floor flange. This supports the meter element at a convenient height for winding on the mousing wire and soldering the leads in place.

Special wire cutter devised

All sleeving and wire leads are cut to the exact length required before the assembly work is started. Wires are stripped of their insulation and fanned out ready to be attached. In cutting these wires to length we have discarded pliers in favor of a cutter which does not mangle the ends. This was made from two discarded power hacksaw blades and a board, the set-up being similar to a plug tobacco cutter.

As a shortcut in extending the current leads of two-wire I-16 elements, it is possible to do the job with only one wire by transposing the position of both the current and potential leads as concerns their respective terminals. The other lead then is long enough to run directly to the terminal beneath it.

In converting the meters the systematic, convenient procedure which has been developed enables the change-over to be made at a very low cost per meter. The system minimizes the labor and overhead cost per meter, which in the long run, will represent an appreciable saving in the new sequence program of the company.

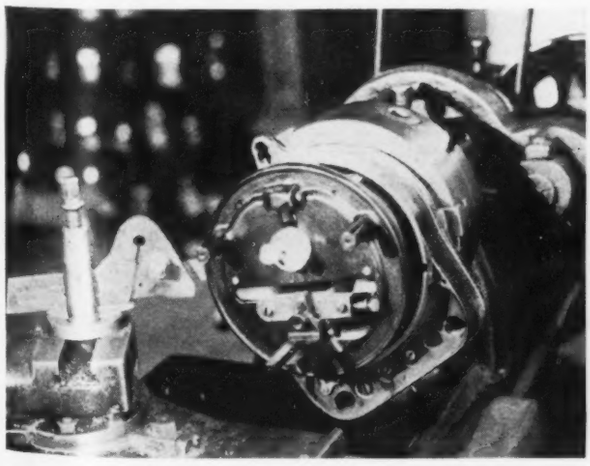


Fig. 3—The grid, mounted on the lathe, has just been cut away from the back, which may be still seen hanging on the chuck

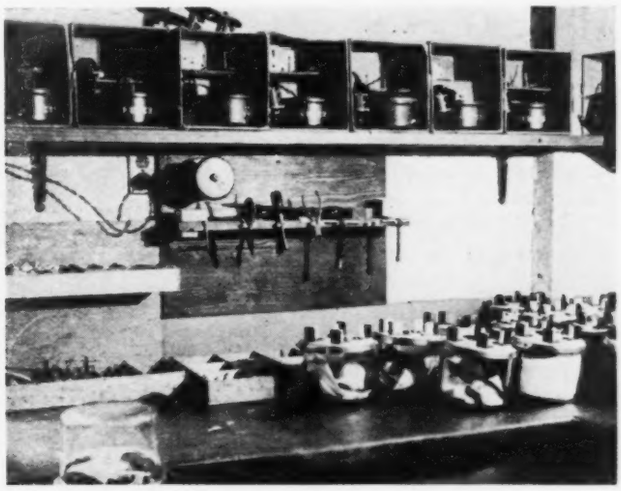


Fig. 4—Assembly bench showing the conversion kits and on the shelf the line of old meter parts which will be used to produce the modern socket type meter

A Scientific Poultry Farm Electrifies

Electrical apparatus automatically weighs and candles 600 dozen eggs per hour

Electric Incubators, Hatchers, Brooders, Air-Conditioned Laying Rooms, a Complete Feed-Grinding Mill, Cold Storage Rooms and Feed Conveyors Are Among the Innovations on Maryland Farm

By B. H. MILLER

Rural Development Division,
Consolidated Gas, Electric Light & Power Company of Baltimore

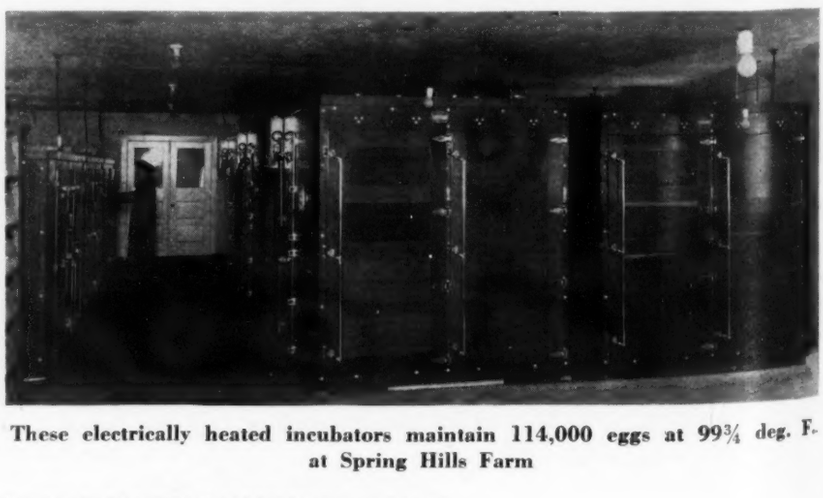
ELECTRICITY does everything but lay the eggs that are the Chief product of Spring Hills Farm, a completely electrified poultry farm near Baltimore, Md., owned by C. E. McManus. Nearly 13,900 electrically encouraged hens are producing 700 dozen eggs daily on this farm, while electrically heated incubators, hatchers and brooders are hatching chicks at the rate of 30,000 a week. An ultimate program of 1,000 dozen eggs and 4,000 broilers dressed for market daily is planned. This program will require between 28,000 and 30,000 laying hens and a continually growing stock of 400,000 young chicks.

The accompanying table gives the breakdown of the electrical load installed at this farm, which at present totals 36.86 kw. for lighting, 15 kw. for incubators and hatchers, 80 kw. in brooders and 173 hp. in miscellaneous power equipment.

An electrically operated laying cage is the basic innovation of the project. This apparatus consists of double rows or batteries of wire cages, each row three tiers high and varying from 30 to 60 cages in length. Automatic equipment provides a scientifically balanced ration to each hen in its individual cage, while a continuous motor-driven belt conveys the balanced ration from a bin at the end of the row, through the entire length of the laying cages. A continuous pan under the cages catches droppings, which are cleaned out by means of a motor-driven scraper. In a separate building (No. 11) the manure is dehydrated, ground and combined with proper ingredients to make a fertilizer of exceptional quality.

During the night and on dark days lights in the laying cages are turned on at intervals in order for the hens to eat and drink. A photo-electric cell in connection with a time switch automatically operates the lights. Laying and brooding rooms are supplied with conditioned air maintained at 60 deg. F. to insure health and maximum egg production.

An egg grading room (upper floor



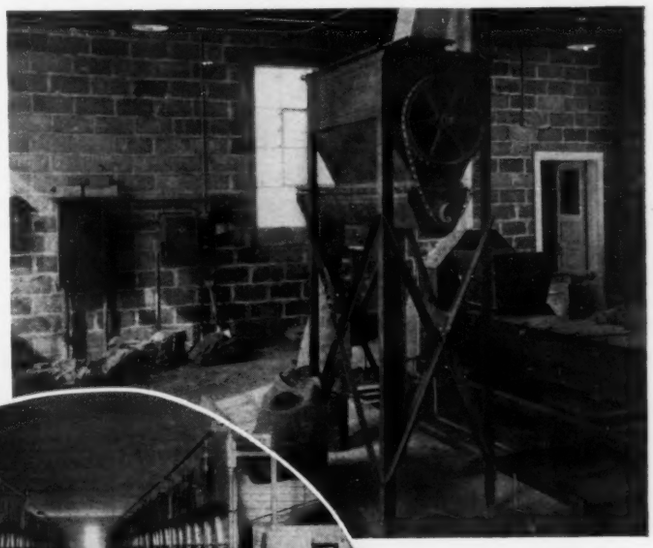
These electrically heated incubators maintain 114,000 eggs at 99¾ deg. F. at Spring Hills Farm

of building No. 7) houses electrically operated grading machines capable of handling 600 dozen eggs per hour, weighing each egg as it passes over 600-watt blue lights for candling.

Electrically heated incubators, hatchers and brooders are housed in buildings Nos. 5, 6, 7, 8 and 12. Temperatures of 99¾ deg. F. are maintained in the incubators, while that in the hatchers is held at 97¾ deg. In the brooders the temperatures are varied from 95 deg. at the beginning of the first week to 70 deg. at the end of the sixth week. At this time the chicks are exposed to room temperatures maintained at 70 deg.

A carload of feed per week is consumed on the farm by poultry and live stock. An old milling building (No. 16) has been reconditioned and equipped with modern-motor driven machines capable of grinding and mixing two carloads of feed a day. In addition to the poultry needs this mill provides feed for an extensive dairy herd, another branch of the enterprise, equipment for which is housed in building No. 13. Cold storage and killing rooms are among the latest additions to the farm and are in building No. 9.

Dehydrating and mixing equipment converts chicken droppings into complete fertilizer of high quality



Two batteries of laying cages three tiers high located in air-conditioned laying rooms house the egg producers. Temperature is maintained at 60 deg. and photo-electric cell time-clock arrangements regulate illumination. Motor drive for carrying feed to hens can be seen at extreme left

Connected Electric Installation for Poultry and Dairy Production

Spring Hills Farm — Cockeysville, Md.

Building Unit	Power Hp.	Light Kw.	Heat Kw.
No. 1 (Laying)			
Four ¾-hp. conveyors	3		
Four ¼-hp. vent. fans	1		
Lighting	....	1.440	.....
No. 2 (Laying)			
Four ¾-hp. conveyors	3		
Four ¼-hp. vent. fans	1		
Lighting	....	1.440	.....
No. 3 (Laying)			
Four ¾-hp. conveyors	3		
Four ¼-hp. vent. fans	1		
Lighting	....	1.440	.....
No. 4 (Laying)			
Four ¾-hp. conveyors	3		
Four ¼-hp. vent. fans	1		
Lighting	....	1.440	.....
No. 5 (Upper Floor Laying)			
Four ¼-hp. vent. fans	1		
Lighting	....	1.440	.....
No. 5 (Lower Floor Incubating)			
Four ¼-hp. vent. fans	1		
Incubators	....	.....	15
Lighting	....	1.620	
No. 6 (Upper Floor Brooding)			
Four ¼-hp. vent. fans	1		
Twenty-four 5-deck brooders	....	.....	12.120
Lighting	....	1.000	
No. 6 (Lower Floor Brooding)			
Four ¼-hp. vent. fans	1		
Twenty-four 5-deck brooders	....	.....	12.120
Lighting	....	0.750	
Two ¾-hp. cond. pumps	1½		
Air compressor	3		
Pump (water)	7½		
No. 7 (Upper Floor)			
Five ¼-hp. vent. fans	1¼		
Egg grader	½		
Lighting	....	1.350	.....
No. 7 (Lower Floor Brooding)			
Four ¼-hp. vent. fans	1		
Lighting	....	1.350	.....
No. 8 (Upper Floor Brooding)			
Four ¼-hp. vent. fans	1		
Lighting	....	1.350	.....
No. 8 (Lower Floor Brooding)			
Four ¼-hp. vent. fans	1		
Lighting	....	1.350	.....
No. 9 (Cold Storage)			
Compressor	20		
Compressor	10		
Three 3-hp. brine pumps	9		
One 2-hp. brine pump	2		
Cooling tower	5		
Lighting	....	0.800	.....
No. 9 (Killing Room)			
Two ¾-hp. dryer fans	1½		
Conveyor	3		
Conveyor	2		
Small conveyor	¾		
Four ¾-hp. wax machines	3		
Two ¼-hp. heat unit fans	½		
Lighting	....	2.660	.....
No. 10 (Breeding House)			
Two ¼-hp. vent. fans	½		
Two ¼-hp. oil burner	½		
Lighting	....	1.520	.....
No. 11 (Dehydration Plant)			
Dehydration machine	20		
Screw conveyor	5		
Water pump	7½		
Oil burner	¼		
Water pump	5		
Hammer mill	20		
Mixer	5		
Sifter	½		
Lighting	....	0.720	.....
No. 12 (3 Brooder Rooms)			
Three ¼-hp. heating fans	¾		
Three 1/20-hp. sol. valves	3/20		
Oil burner	1		
Two ¾-hp. cond. pumps	1½		
102 five-deck brooders	....	.....	56
Lighting	....	7.140	
No. 13 Dairy			
Refrigeration	2		
Brine pump	¼		
Pasteurizer	¼		
Two bottle washers	½		
Milking machine	¾		
Clippers	¼		
Oil burner	¼		
Lighting	....	1.850	.....
No. 14 Office			
Water cooler	½		
Lighting	....	0.900	
No. 15 Engine Room			
Cond. pump	5		
Oil burner	1		
Circ. pump	¾		
Two ¼-hp. fans	½		
Lighting	....	1.300	.....
No. 16 Mill			
Motors for grinding, mixing	47		
Lighting	....	2.000	
No. 18 Residences (2)			
Lighting	....	4.000	.....
Total	173	36.86	95.24

Series Capacitor Wipes Out Feeder Flicker

Largest Capacitor by Instantaneous Response Eliminates Stubborn Flicker Originating in Industrial Load Off Residential Feeder

Obstinate and involved cases of flicker and poor regulation have been met by various combinations of excitation, induction regulators, boosters and tap changers. The real stubborn cases seem almost to call for anticipatory correction. The nearest available approach is the series capacitor's instantaneous response. Here is a clear-cut instance of its effectiveness.

By JOHN J. LEWIS
Stamford Gas & Electric Company, Stamford, Conn.

AT FIRST glance it would appear that transmitting 4,500 kva. a distance of 4.5 miles would offer little or no difficulty. This was true in the area served by the Stamford Gas & Electric Company for several years, but the fall of 1934 saw a complete change in the picture. "My lights flicker at night," was a complaint that rapidly became so common that it was not necessary to set recording voltmeters to check on the customers' eyesight. The solution required a complete study of the circuit and the loads supplied by it.

The diagram (Fig. 1) shows the simple radial system involved. There are five generators in the station. The two larger ones are rated 15,625 and 18,750 kva. at 0.8 power factor. The peak load is about 20 Mw. Circuit No. 571 feeds a brass rolling mill with a maximum demand of approximately 2,000 kw. The total impedance between buses was 8.7 + j14.2 per cent on a 4,500-kva. base. This is the capacity of the line.

Cause of the trouble was readily located. The rolling mill had discontinued the use of an 1,100-hp. synchronous condenser for power-factor correction. With the condenser off the line, whenever the mills were operated during the evening hours the flicker condition was very serious. Load swings of 1,350-kva. and over occurred every twenty to thirty minutes and swings of lesser magnitude much more often. This resulted in a great many complaints from the customers served from the Springdale substation.

Synchronous condenser not wholly effective

Operation on this line was not good even with the synchronous condenser. Voltage regulation was slightly over 16 per cent. Actual operating conditions showed a variation from light load to full load that closely approached this figure. The taps on the transformers could not be changed because at times of light load the synchronous condenser caused an undesirable voltage rise in the rolling mill and the time of operation of the condenser was beyond the control of the power company. This made it necessary to install the two boosters shown in the diagram.

A previous study of the line showed that it would be economical to increase the size of the conductors from No. 4 to No. 1/0. Unfortunately this change in wire size would have had very little effect on the total impedance between the buses. The regulation would have been reduced by only 3 per cent and most of the flicker would still have been in the visible region. Therefore, some other means had to be considered.

Induction regulators, if used on each of the unregulated circuits, would have permitted raising the taps on the transformers. This would have improved the average voltage and eliminated the two boosters. The flicker, however, would not have been changed because an induction voltage regulator operates after the drop takes place. This fact is illustrated by the failure of the regulators on the two residential feeders to compensate for the sudden drop in voltage.

Alternative discarded for series capacitor

The low power factor of the load made it necessary to reduce not only the resistance but also the reactance. True, a parallel line would accomplish this in part, but the regulation would

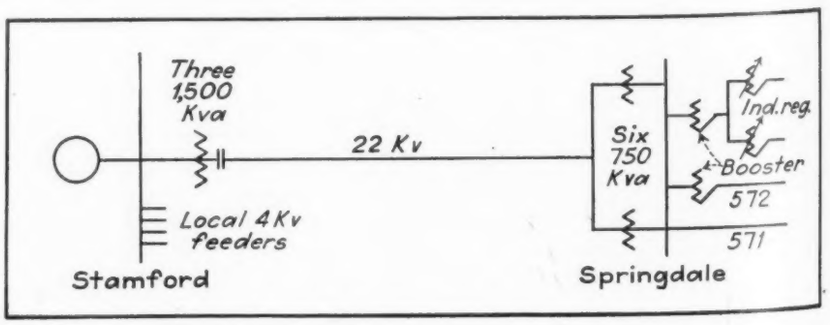


Fig. 1—Flicker on this trunk feeder was alleviated by series capacitor

still have been 12 per cent. Furthermore, the cost would have been high in view of the small improvement. This left two methods of correction for consideration. Either a synchronous condenser at the receiving end of the line or a series capacitor would correct not only the bad flicker but also the poor average voltage on the substation bus. If a synchronous condenser would solve the problem, consideration had to be given to operating the 1,100-hp. machine in the rolling mill. This proved to be undesirable because the machine was a rewound slow-speed alternator without an amortisseur winding. This made it impossible to start the machine except at times of light load in the rolling mill, so that it would have had to operate 24 hours a day. Besides this, the efficiency was very poor and, at best, the results that could be obtained were only passable.

High efficiency offsets continuing line loss

A new synchronous condenser would have been the logical choice in many places. It improves power factor, reduces losses and increases the available substation capacity. These factors were all considered. Reduction in losses was desirable, but it was greatly overbalanced by the relatively high machine losses. The increase in substation capacity would have been more valuable if the station was serving a smaller load area so that the additional capacity would have been useful in the near future. Such was not the case. The time is rapidly approaching when a second substation will be needed at a load center which is now fed from the Springdale station. When this takes place at least one of the feeders will be transferred from the Springdale substation to this new location.

The series capacitor does not improve the power factor of the circuit. Consequently, it cannot reduce line losses nor increase the available substation capacity. It does, however, improve the power factor of the load on the generators. To offset the first of these facts there is the remarkably high efficiency of the static condensers used to build up a series capacitor. The losses are approximately one-third of 1 per cent and they vary directly with the loss factor of the circuit. This results in a very low annual energy loss.

A synchronous condenser would have required considerable space at the receiving end of the line and there was no readily available real estate to be had. At the sending end there was ample room and, since the line feeds a single load, a series capacitor could be installed there. Where a line feeds a distributed load, however, it may not be possible to utilize such a location, because at full load the increased voltage on the load side of a series capacitor may prove to be troublesome.

There remained for consideration two questions, maintenance and reliability. A synchronous condenser would have required a frequent routine inspection at least. The capacitor, being a static device, ought not to require much more than a periodic coat of paint. This latter assumption is based on the results that a number of industrial plants are having with shunt condensers used for power-factor correction. Local experience has been practically trouble-free. All of these factors were given a value that took the local situation into account, with

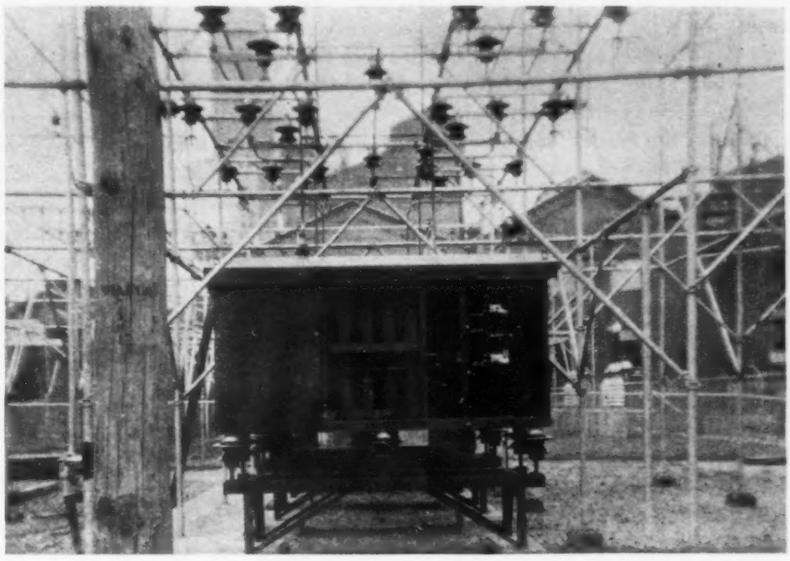


Fig. 2—Three single-phase units comprise installation

At present the largest series capacitor in the world. It is rated at 337 kva. per phase, 2,850 volts and 118 amp. The reactance is —j22.5 per cent on the 4,500-kva. base. Insulation to ground is supplied by the supporting insulators. Each metal housing contains the protective mechanism and 24 individual condenser units. Sufficient space was provided for twelve additional units to care for a change in voltage or an increase in load.

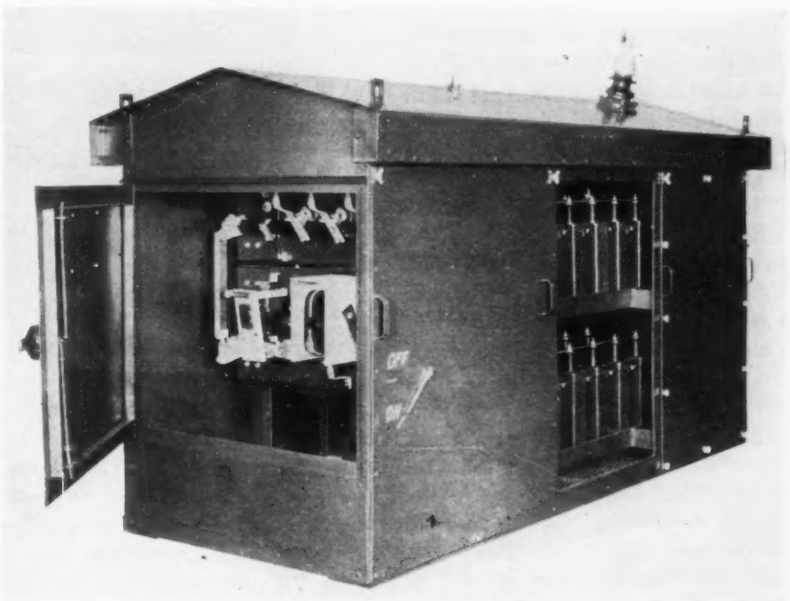


Fig. 3—Outdoor 22-kv. General Electric capacitor unit has protective panel in end compartment

the result that the ratio of annual charges was three to one in favor of a series capacitor. It must be remembered that this result was obtained under conditions that were most favorable to the series condenser and quite the contrary for the synchronous machine.

The line voltage is 22 kv. with a distinct possibility of changing to 13.8 kv. in the future. This is an unusual voltage change to consider, but in this case it is perfectly logical. The generator bus voltage is 4 kv. Two of the machines are insulated for 13.8 kv. It is quite probable that future needs will require changing the bus voltage to 13.8 kv., in which case the step-up transformers would be eliminated.

Flicker gone, regulation flat

Ten months' operation has given a fair picture of the results to be expected. The protective equipment used to shunt the capacitor during external faults on the circuit has always functioned perfectly. Since none of the units have failed, the internal fault protective device has had no occasion to operate, and we hope never will. The capacitor is easily cut into and out of the circuit using air-break switches, so that it may be removed from service for inspection at any time. *Voltage regulation on the Springdale bus has been practically flat and the annoying flicker has entirely disappeared.* Unfortunately, there is one defect.

The series capacitor was installed in June and placed in operation on July 1, 1935. Shortly thereafter the owner of the rolling mill decided to again operate his synchronous condenser. All was well just as long as the load did not require more than one of the two large generators on the bus at one time. When this became necessary it was found that an unstable condition existed. A state of oscillation known as negative damping was set up between the synchronous condenser and the two generators. Regardless of the distribution of load between the two machines, this condition persisted. Reducing the field on the condenser lessened the oscillation, but did not eliminate it. This oscillation was not set up with any other combination except the two generators noted. As the station load increased the trouble became less, so that during the winter months no difficulty was experienced. While this was very inconvenient for a while, it is not a very alarming situation.

There are several ways of curing the trouble, some of which may come to pass. The system load may increase sufficiently so that the instability may not be set up. This, of course, is a matter of time. A second cure would be the elimination of the synchronous condenser. This machine is run for power-factor correction by the owner of the rolling mill. Due to the starting difficulties referred to, it is operated a considerable part of the time at low excitation, resulting in a low annual efficiency. This makes the installation of a shunt condenser a very economical proposition. In fact, such an installation is now under consideration.

Occasional oscillation to be eliminated

If neither of these events comes to pass there are still two other ways of eliminating the oscillation. A reactor could be placed in the circuit between the customer's transformer bank and the synchronous condenser terminals. With the proper design the circuit could be restored to its original condition. The second, and the one which will be tried first if the oscillation again appears, is a compromise solution.

The possibility of a voltage change has already been noted. In order to provide a piece of equipment that would operate satisfactorily when such a change takes place certain details in the design were specified for the manufacturer. The circuit constants are such that the voltage drop across the capacitor when operated on 22 kv. is very close to twice that which will be required when the voltage is changed to 13.8 kv. For this reason the condenser units were built for 1,425 volts and two connected in series. In the event that the oscillatory condition appears again half of the condensers in each phase will be short circuited and thereby reduce the reactance of the series capacitor to —j11.25 per cent. Operating conditions will not be as good, but since the change will be necessary only during the summer months it will be a reasonable solution.

It is difficult to pass judgment on the series capacitor with such a short period of operating experience. At present it appears to meet a definite need in the distribution of electric energy. It is particularly adaptable to a circuit with a high ratio of reactance to resistance and a low power-factor load. One thing must be remembered. A series capacitor will not maintain voltage at a given point except under the exact conditions of current and power-factor for which it was designed. For this reason it cannot be considered as a substitute for an induction regulator. It may better be thought of as an addition to the "seven" or more other devices available for voltage regulation, none of which, however, possesses the most important characteristic of the series capacitor—instantaneous response.

INDUSTRY IS READY, BUT LACKS CONFIDENCE

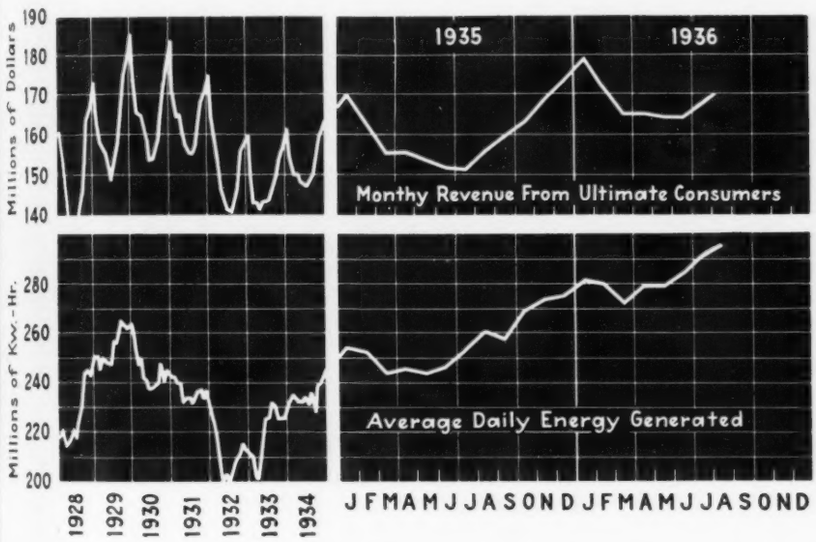
The past year will be remembered by some for the advent of boondoggling sponsored by our national government; by others, for the growing unrest in the labor situation, but it will be remembered by all as that period when taxation increased to a point difficult of human conception. Industry, while enjoying at present the best production rate in the past five years, faces the future with some uncertainty. . . . If granted freedom from political control, industry will meet today's conditions and go forward, for it has been modernized and rebuilt.—W. H. BURR, Lukens Steel Company, to Association of Iron and Steel Engineers.

Utility Operations Mount

August revenue up 8.7 per cent, energy sales 16.8 per cent; both set new summer records. Industrial use larger than ever before.

MORE revenue, more energy output and larger sales than in the like month of any previous year characterized the August operations of the electric light and power industry, according to statistics announced by the Edison Electric Institute. Revenue rose about $2,000,000 compared with July to $169,636,200, which is 8.7 per cent more than the amount a year ago. At that time a new record was established for August. The rate of gain relative to the corresponding period of the previous year is the largest for any month in the recovery period except July, 1936, when it climbed to 10.9 per cent, and it compares with the growth recorded during the active era prior to 1929.

The amount of energy generated was 9,178,700,000 kw.-hr., the increase over a year ago being 13.8 per cent. The total was the largest ever recorded for any month, although August is normally one of the low months of the year. Reduced stream flow cut the output from water power 10.7 per cent from last year's figure so that it constituted only 30 per cent of the total production. Output from fuels increased to an all-time high of 6,422,300,000 kw.-hr., or 28.7 per cent over a year ago.



Industrial sales up 20.2 per cent

Energy sales to ultimate consumers also set a new record of 7,723,413,000 kw.-hr., 16.8 per cent above last year's August. The most striking item was the gain of 20.2 per cent in sales to wholesale commercial customers, which amounted to 4,487,257,000 kw.-hr. For the third consecutive month the 1929 peak has been exceeded and the excess has steadily increased. Moreover, there has been an uninterrupted rise since last February.

Retail commercial sales were 15.6 per cent higher than a year ago; sales for domestic use were up nearly 10 per cent. Average consumption per domestic customer for the twelve-month period was 705 kw.-hr. and the average rate 4.82 cents. The former was 7.5 per cent more and the latter 6.4 per cent less than in the preceding twelve months.

Table I—Monthly Revenue from Ultimate Consumers and Energy Output of Central Stations in the United States

Compared with Corresponding Month of Previous Year

Month 1936	Revenue from Ultimate Consumers†		Energy Generated, Millions of Kw.-Hr.*					
			Total		Hydro		Fuel	
	Thousands of Dollars	Per Cent Inc.	Gen.	Per Cent Inc.	Gen.	Per Cent Inc.	Gen.	Per Cent Inc.
August	169,630	+8.7	9,178	+13.8	2,756	−10.7	6,422	+28.7
July	167,672	+10.9	9,067	+15.6	2,832	−14.8	6,235	+38.1
June	164,007	+8.3	8,592	+14.0	2,996	−7.5	5,596	+34.1
May	164,015	+7.1	8,604	+14.0	3,702	+ 5.3	4,902	+21.2

Table II—Regional Revenue and Energy Output in August, 1936

Compared with Corresponding Month of Previous Year

Geographical Region	Revenue from Ult. Consumers		Energy Generated, Millions of Kw.-Hr.*					
			Total		Hydro		Fuel	
	Thousands of Dollars	Per Cent Inc.	Gen.	Per Cent Inc.	Gen.	Per Cent Inc.	Gen.	Per Cent Inc.
United States	169,630	+8.7	9,178	+13.8	2,756	−10.7	6,422	+28.7
New England	14,061	+8.3	593	+9.0	135	−31.8	458	+30.7
Middle Atlantic	46,213	+5.7	2,224	+15.1	399	−25.5	1,825	+30.7
East No. Central	38,195	+7.2	2,155	+13.4	110	−41.3	2,045	+19.6
West No. Central	14,608	+9.4	581	+7.2	59	−60.4	522	+33.0
South Atlantic	22,865	+18.1	1,114	+19.4	429	−10.5	685	+50.5
East So. Central			334	+14.4	200	−14.2	134	+132.0
West So. Central	10,140	+8.9	511	+14.8	11	−6.3	500	+15.1
Mountain	5,396	+9.3	358	+11.4	281	+6.0	77	+36.0
Pacific	18,158	+8.4	1,308	+11.0	1,132	+7.7	176	+38.0

*By courtesy of U. S. Geological Survey, with deductions for operations not regarded as central station.
†Preliminary, Edison Electric Institute.

Table III—Allocation of Energy August, 1936

Compared with Corresponding Month of Previous Year
(Edison Electric Institute)

Class of Service	Millions of Kw.-Hr.	Per Cent Inc.
Total for distribution*	9,276	+14.8
Lost in transmission, etc.	1,553	+ 6.0
Sold to ultimate consumers	7,723	+16.8
Domestic	1,180	+ 9.9
Com'l, small light and power	1,361	+15.6
Com'l, large light and power	4,487	+20.2
Municipal street lighting	188	+ 4.3
Railways—street, interurban	340	+ 2.3
Railroads—electrified steam	97	+44.2
Municipal and miscellaneous	70	+43.3

*Generated, purchased from other sources, imported, less energy used in railway and other departments.

Editorials

L. W. W. MORROW . EDITOR

Inspectors Join Cause of Safety Education

WIRING codes go far in insuring electrical safety in the home, but there still are myriads of ways in which the householder can nullify to his peril all that high-grade installations may have done by way of such insurance. Even where the regulations are supplemented by competent inspection the householder will resort to bungly makeshifts, inject non-approved stuff and let the cords create a hazard. Education is what is needed, and the electrical inspectors have initiated a move toward doing their share in this educational job aimed at enhancing still more the record of safe use of electicity around the home.

The association has just put out a booklet with a judicious treatment of what to do and what not to do, and the pictures are especially well chosen to be convincing without being scareful. Participation of the inspectors in the general safety education movement should be welcomed, because they are in a position of impartial authority and have ready means for spreading the gospel to homes and through schools. They can do the task with the feeling that they have the support of the whole industry in multiplying convenience and comfort with less and less risk of occasional mishaps arising out of carelessness and ignorance.

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President to Office Boy to Get Sales

"SOME executives think all they have to do is to hire a sales manager," stated an experienced utility officer. "The hardest job is to convince the presidents that sales is their major executive job these days and one that cannot be delegated. If we are really to get the business available every one from president to office boy must tie into sales enthusiastically as a part of his job." That is the secret of selling in a nutshell — selling that puts volume business on the lines rapidly.

No sales manager can work alone or as executive of a sales department and expect the results that can be had if the entire organization supports and aids the sales program. Yet many utilities today have sales departments only. It is infra dig for other departments to soil their hands with selling. Many company executive officers know nothing about sales, but many act wise, especially when sales budgets are presented.

This day has passed in utility organizations. The salvation of any company lies in just two things — increasing sales and improving public relations. They are almost synonymous terms. And when some properties add 200 kw.-hr. per year to residential use in a year and sell $60 of appliances per customer in their territory, how long will those that add 15 kw.-hr. and $10 of appliance sales be able to hold out? For the ultimate result of these sales programs is lower and lower rates.

Now is the time and the opportunity to get selling done in volume so that rates can be lowered and the business be made more profitable. The public is receptive. The methods for selling are proved. There is no secret about getting the business. It takes action from top to bottom. Those who don't go into action will find themselves on the spot in a few years. No one can hide out in this industry.

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Product Quality Only One Furnace Asset

ONE fault of human nature is to overdo a good thing, talk about it too loud and too long. Maybe industrial engineers are fed up on the claim that electric melting makes a better quality product and the gain can be expressed in dollars. They don't deny it, but even a popular song can become anathema when done until it becomes a din.

Here, as a contrast, are some other reasons why electric furnaces have been bought recently. What are dominant reasons for one are inconsequential for another, so the reader can arrange them in his own order of importance. One furnace was bought to head off intolerable working conditions should we have another summer like 1936. Low metal loss in semi-precious alloy production ruled in another instance. Electric melting eliminated briquetting where red brass borings were melted in a cupola. An automotive plant is using one to try out the casting of copper steel. The little fellows are being used to make such trinkets as special welding rod parts where dirt and fumes would clash with the rest of the atmosphere.

Salvage of high-speed tool steel is the task of one

furnace, and before long it may have a mate to assuage its loneliness. In another instance an indirect arc furnace is preheating and melting the alloy additions that go into the casting of huge die blocks from a cupola. Somebody else is keen for utilization of scrap that can be held to a desired analysis better than use of virgin metal compositions. Another takes advantage of new automatic accessories so that operator attention is less important, electrode life is longer, power and lining replacements are cut and, above all, the metallurgist can duplicate his melt technique.

Add all these to the undenied maintenance and enhancement of quality and all they mean to longer service life and fewer rejections during machining of the product and electric melting has an array of appeals that are steadily widening its area of usefulness.

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Outdriving Your Headlights

DURING the past six years deaths from automobile accidents at night have increased 37 per cent. Deaths from daylight mishaps have decreased 12 per cent. These facts tell the story of the toll taken in night driving on dark highways.

These night accidents are preventable. The cost of rendering night driving safe is less than the present cost of accidents. Yet very little progress is being made in getting a widespread installation of highway lighting. This is the one answer to the problem.

Both the new sodium highway lights and the new incandescent lights with reflectors can be installed to give no glare and adequate light. Sample installations show what can be done to render headlights unnecessary. We have now developed highway lighting that will give safe driving. The electrical industry should get back of the highway-lighting movement for it is a good business as well as a social service.

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Surveys Tell Where Appliance Market Lies

NO MATTER how much one may decry the boondoggling aspects of some of the alphabetical undertakings, there have been instances of potential good. For example, the C.W.A. under the direction of the Department of Commerce made a real property inventory of 64 well-distributed cities. It sets forth information about living conditions in dwellings to a degree not previously available. Check was made of electricity and gas service, which was being used for cooking, whether mechanical refrigeration was available and what was being done about hot water. In the general city summaries, just published, the data are broken down geographically into city, environs and metropolitan districts, and there is further breakdown into dwelling classifications.

These assembled data should prove useful for nation-wide producers and distributors of electrical facilities for the home because they tell where the market is, expressed in terms of buying power as reflected by rentals. Of course, the data were collected by precincts and the "work" sheets, therefore, contain areal details which are of even greater significance to the utilities and the local dealers with whom they cooperate in cultivating appliance saturation. Brooklyn has taken this sort of data and expanded into a comprehensive portrayal (elsewhere in this issue) of its domestic and commercial market. It paints a vivid picture of the semi-served home and identifies the districts where each drive should be concentrated if preferred results are to be expected. The electrical industry can profitably look into Market Research Series No. 11 (10 cents buys a copy) to avert backlash in home programs.

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Power-Factor Correction for Capacity

INDUSTRIAL plants and utility plants are now loaded and the demand is increasing. Capacity is needed. But the answer to more capacity is not necessarily the addition of generating equipment. An inexpensive and quickly applied solution is to remove wattless loading through power-factor correction. What counts is the real power in lines and equipment. We venture to say that at least 30 per cent of the present loading is wattless power.

Both synchronous and static condensers are perfected. They are low in first cost relative to generating plants. The synchronous condenser fits admirably on large transmission systems to unload transmission lines. The static condenser fits on feeders, at load centers and in industrial plants. A combination of these two corrective devices applied to any area will go far to increase the capacity of the power system and the factories to do work.

Another advantage is that corrective devices can be obtained quickly and installed quickly, while generating plants can be in operation only after at least a year or more. The added loads now creeping up in industry and on utility systems will create a power shortage that cannot be met in time by the delivery of generating equipment. Power-factor correction will be found the only answer to meet the capacity needs in time. And it will be found to be the economical answer also in many instances. Both utilities and industrials will do well to study this opportunity to get more capacity quickly and economically.

Comments on Electrical Futures

IN CHICAGO the air is full of smoke and dirt. In New York the air is cleaner than in most cities one-tenth its size. In Chicago one's collar and cuffs are likely to be a bit grimy toward the end of the day. In New York strangers marvel that they can wear their linen so much longer than at home.

Of course the answer is that in New York coal is burned more economically than in Chicago. Plus the fact that all steam-operated railroads serving the Eastern metropolis stop across a wide river. Those railroads entering the city proper are electrified. Whereas in Chicago, while there is a little electrification on suburban lines, there are probably fifty smoke-belching locomotives for every one electric.

But even that is included under the heading of economical burning of coal.

In Chicago most of the hotels and many of the office buildings not only have their own heating plants but they have their own electric-generating plants. In fact, the hotels are the prizes for which coal salesmen strive. Whereas in New York most of the hotels and office buildings are not only supplied with electricity from the central stations, but a very much greater proportion than in Chicago are heated by a steam conduit system from a central plant. New York, however, is concentrated in a small area.

In these big central stations, where costs are calculated down to many decimal places, coal is burned economically. It has to be or the company gets somebody else on the job. Smoke means waste of coal, and coal costs money. Of course that is only one of the factors making for economy in large plants. There are many others. That is why there has been so much consolidation. That is why experts are so aghast at the economic folly of the government duplicating existing facilities.

COAL burned in central plants does not have to be hauled through the streets of the business section of town. In most cities bordering on rivers or tidewater the coal is taken into the plant direct from barges. The trucking expense is saved. Even in cities having no water transportation the plant is always served by a railroad spur. But this is only a fraction of the saving that can be made in a very large plant as compared with a small one. This saving is multiplied, of course, when the comparison is between a big central plant, capable of supplying a large city, and the type of plant which would provide current for a hotel—even the largest hotel in the world.

All of which is interesting in that it demonstrates the tremendous future which lies ahead of the electric industry, for there are very few, if any, cities which are so completely served by central power stations as is New York. Naturally in every one that is not there is the opportunity for expansion on the part of the electric companies, gradually taking over the service now supplied by uneconomic and wasteful small units.

It is just announced, for example, that a Chicago Commonwealth Edison Company affiliate is about to spend five millions to complete a plant addition started before the depression. This will add 95,000 kw. to the Edison company's power reservoir. But this has been necessitated, the company explains, by gradual growth of the demand for power. It is no wholesale taking over of the small jobs now being performed by individual plants, such as those in the Chicago hotels.

IN CONSIDERING the future of the electric industry it is also interesting to note that the total cost of this additional plant capacity of Commonwealth Edison of Chicago is not five millions, but fourteen millions. Nine millions were spent when it was thought that the uprising curve of demand would force the providing of this additional capacity—back before the crash. With the falling off of demand during the depression the new capacity was not regarded as necessary. Now the curve of demand is rising so rapidly that the company is being forced to provide this additional reserve.

This sort of thing, beyond the shadow of a doubt, is happening all over the country. Sometimes it is identical—where plants were begun, back in 1929, and then never finished when it was seen how sharply the demand for current fell off. In other cases plans for new plants, or additions to plants, or replacement of obsolete plants, were discussed, and then postponed.

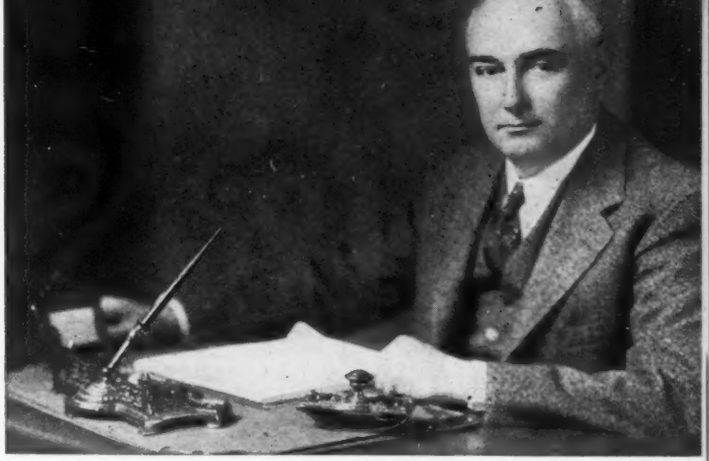
Another big factor which will work for the growth of the electric industry is the strong probability that there will be some modification of the tax on undistributed earnings. There is no possibility of any change which will radically affect taxes for the calendar year 1936, which become due on March 15 next, but there is an excellent chance that changes will be made which may vitally affect corporation spending in 1937.

Pressure is very strong for a change which will permit replacements, or at least permit a very liberal allowance for replacements, in figuring the amount of "undistributed earnings" subject to the tax. Naturally such a change will not be made without a fight. There are too many members of the House and Senate who think that baiting corporations and "soaking the rich" are good politics for them personally.

This is not so important in the House as in the Senate, where a small group of men, sometimes just one or two, can hold up passage of bills indefinitely. But the session of Congress which comes in January is not like the old sessions of Congress which used to follow elections. In the first place those were "lame duck" sessions, cluttered up with members who had been defeated for re-election, or who had decided voluntarily to retire.

In the second place those sessions had a sharp time limitation. They died with the stroke of noon on

—By CARTER FIELD



This noted journalist gives his personal comments and interpretations on current happenings affecting the electrical industry. His background and his location at Washington make his thoughts informative and interesting even though all may not agree with him.

March 4. So that it was very easy for a few Senators to talk any measure to death so far as that session was concerned. Whereupon, unless the President chose to call an extra session, there would be no further meeting of Congress until the following December.

This will be the first meeting of Congress after a presidential election in which this is not the case. The session which meets in January can run as long as it pleases. In fact, the House and Senate have to agree on an adjournment date to wind it up. So it is not likely that any small minority will be able to prevent passage of a measure which has the backing of a majority in both houses, and the approval of the President.

IN VIEW of this situation, which naturally is of tremendous importance to business of every variety, but especially to an industry where improvement is so breathtaking and obsolescence so rapid as in the electric industry, every effort should be made by individual business men and corporation executives to see to it that the senators from *their* states, and the representatives from *their* districts, should be thoroughly acquainted with the importance of drastic changes in this law. Its importance not just to the business men and executives interested, nor even to the security holders of their corporations, but to the communities in which the enterprises exist, should be laid before the senators and representatives.

For example, a member of the House might become really interested in working for a change in this law if it were made clear to him, and to his constituents, that on such a change would depend whether a corporation in the leading city of his district would spend $50,000 or $500,000 for betterments. The newspapers of that community should be made to understand the situation, to help make the simple economics of the problem clear to the constituents of this particular congressman. This may in many cases be vital.

It frequently happens that a senator or member of the House understands such an economic situation perfectly, but does not believe that his constituents do. Believing this, he may not *dare* vote for what he himself thinks is sound. It is all very well for an impatient business man, not himself in politics, to sneer at such a legislator. But that legislator has a case which should be appreciated, no matter how little one may admire his lack of courage.

Courageous men do not too often win re-election, unfortunately. Some of the senators and representatives who permit themselves the luxury of voting just as they think sound, without regard to minority groups with whose views they do not agree, are beaten more often than not when they come up for re-election. In fact, a moment's thought will bring several spectacular cases to mind in the last few years. Several of these outstanding cases were men who attempted, whenever legislation affecting business came up, to give business a fair deal.

The senator or representative who wants to stay in office—and most of them of course do—has plenty to worry him without taking a chance of angering any substantial block of his constituents when it isn't necessary. Men in public office are not just judged coldly on their records. They have to watch out for all sorts of things. Particularly they must not permit the parade to go by them. As for example a lot of constitutional Democrats and anti-sumptuary law Republicans who held out against prohibition when the dry wave was sweeping over the country during the Woodrow Wilson Administration. As for example a lot of senators and representatives who did not notice that the dry tide had receded and the wet wave was running strong during the Hoover Administration.

MEN who make a business of getting elected to public office are aware of all these difficulties. The more wary they are of getting groups back in their states or districts sore with them the longer they are apt to stay on the payroll—or, what to many of them is more important—in power.

Moreover, it would do the business men of a congressional district no particular good if they had a representative who would always vote for the sound thing, economically, without any regard for what large groups of his constituents might think, however wrongly, of his actions. He would only last one term, and those business men would find a congressman representing their district who might not only vote against their interests, but be rapidly eager to hurt them!

Believe it or not, like it or not, that *is* Democracy. And its going to keep on being like that whether successful business men like it or not. Its one of those things that make many students of history observe that the ideal form of government is a benevolent despot. But there are plenty of objections to that, too, though it is about the only method of government which would be the real answer to the criticism so many business men make of Congress. So it might not be a bad idea for business generally to start a campaign of education, *locally*, in each district and state, *not* a Liberty League type of effort, so that your senator and your representative will not be *afraid* to vote against *your* interests.

News OF THE WEEK

Two Companies Announce Plans to Enlarge Generating Stations

Duke Power will add 75,000 hp., State Line to complete net capacity of 142,000 kw. — Contracts total $8,000,000

From two utility companies came news early this week of two construction programs totaling $8,000,000 for more than 265,000 hp. of capacity.

Duke Power Company has awarded the contract for a 75,000 hp. turbo-generator to be installed at River Bend steam-electric plant on the Catawba River, 10 miles from Charlotte. The expenditures will amount to approximately $3,000,000, work is to start immediately and the new unit is expected to be operating in eighteen months.

The company anticipates that the additional capacity will be ready to be placed in operation before it is needed. Upon completion of the new installation, capacity of River Bend station will be 225,000 hp., making it one of the largest in the southeast.

Effective November 1, Duke Power Company made effective lower rate schedules for electric and gas consumers, reducing bills by approximately $1,100,000 annually.

Residential electric customers will save $174,000 per year; commercial, $197,000; textile customers, $507,000; municipalities, $65,000; industrials, $60,000; small power, $35,000; balance of $62,000, gas customers.

State Line unit to be completed

Work halted in 1932 on unit No. 2 of Chicago District Electric Generating Corporation's State Line station will be resumed, said James Simpson, chairman Commonwealth Edison.

Five million dollars will be required, of which four million is new money, and Commonwealth Edison has applied to the Illinois Commerce Commission to subscribe for this amount of new stock of the Generating Corporation. More than $9,000,000 has already been spent on unit No. 2.

Said Mr. Simpson:

"Commonwealth Edison Company's request for authority from the Illinois Commerce Commission in connection with the proposed resumption of construction on unit No. 2 at the State Line station of Chicago District Electric Generating Corporation is the first of several steps that will have to be taken before work can be started. It does, however, emphasize the fact that as an electric utility experiences increased business, it must in time invest more capital in generating capacity. For some months increasing demands for electricity by customers of Commonwealth Edison Company have been the subject of studies by the company's engineers. These studies demonstrate that in order to permit the company to carry its anticipated load, it will have to secure additional capacity by the winter of 1937-38.

"Present indications are that the Commonwealth Edison Company's own load for the coming winter will approximate 960,000 kw. and that the company will have to face a demand for 1,071,000 kw. in the winter of 1937-38. The company's engineers further estimate that it will secure additional capacity of about 75,000 kw. at that time from Public Service Company of Northern Illinois through the operation of the existing interchange energy contract. Including this capacity, and an additional 30,000 kw. from a new high-pressure unit now being installed at Fisk Street station Edison would have available a total effective capacity of 1,148,300 kw. through the winter of 1937-38. This would not leave the company with a reserve sufficient to insure reliable operation, considering weather conditions and unavoidable outages of equipment. It will therefore be necessary for Edison to secure the additional 95,000 kw. which will be available to it in October, 1937, from the proposed State Line unit No. 2, in order to place itself in a position adequately to meet estimated demands for energy.

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Kentuckians Scan T.V.A. Prospects

Practically the entire State of Kentucky is T.V.A. territory, a group of municipal officials on a tour to Norris Dam were told last week. Thirty-four representatives of twelve Kentucky municipalities, headed by Mayor Neville Miller of Louisville as president of the Kentucky Municipal League, conferred with T.V.A. officials in Knoxville on the prospects of T.V.A. power extension in that state.

After the conference Roy H. Owsley, field consultant of the Municipal League, said they were told "that practically the entire State of Kentucky is within an area which possibly could be served by T.V.A." Those attending the conference included David E. Lilienthal, T.V.A. director; E. Falck, T.V.A. rate expert; J. C. Swidler, attorney, and W. I. Nichols, director of electrical developments.

"Electrical World" Editor Resigns, Will Resume Industrial Career

L. W. W. Morrow terminates editorial service of fourteen years to engage actively in new product development of Corning Glass Works

L. W. W. Morrow, editor of ELECTRICAL WORLD since 1928 and member of the editorial staff since 1922, is resigning November 15 to become general manager of the fiber glass division of Corning Glass Works, Corning, N. Y.

Twelfth in a line of distinguished editors of ELECTRICAL WORLD, Mr. Morrow piloted the magazine through the worst depression in history. The many diverse forces in constant flux around the paper Mr. Morrow patiently resolved into a resultant that pointed always toward his conception of true worth. The institution that is ELECTRICAL WORLD he preserved. And yet he seemed always to have time to enrich his store of personal friends —so many of them figures who shape the destiny, day by day, of the electrical world.

"For fifteen years I have had the pleasure and privilege of being an observer and commentator on the electrical industry," the editor told his staff. "My whole experience as an editor has been a pleasure and an education because it has been illumined by opportunities for service and strengthened by friendships.

"In our jobs as editors I know that the essence of our devotion to work is a desire to serve the industry and to help it go forward. This is the tie that binds.

Standards for editing

"With perhaps a justifiable pride, we can look back over the years and discern two major accomplishments: (1) We have seen our suggestions carried out by the industry, for we have maintained a position of thoughtful and sound leadership in industry affairs; (2) we have never printed any policy, statement or article based upon expediency or selfishness. We have advocated no policy in the past for which we now need apologize. We have supported no program that time has proved unsound or illogical.

"These two things have been possible," said Mr. Morrow, "because we have had an intelligent and informed team of men in intimate contact with the industry and yet they have had a perspective and judgment that viewed events as part of a rounded whole; as part of the industry's true progress.

"In all this period, ELECTRICAL WORLD has sought to lead and not to follow. It has earned a reputation for balance, for good judgment, for advanced and logical thinking. This is the standard that will be maintained in the future."

L. W. W. Morrow

Record shows great versatility

The "record" of Mr. Morrow, as set forth in "Who's Who in America," marks him as an individual of broad background, versatile accomplishment. The record of his career shows him as an author, educator, engineering consultant, lecturer, writer and editor.

Cornell University, Yale and the University of Oklahoma know him as a professor and director of electrical engineering. Yet during the summer season he was active in the business world as a consultant for large power, industrial and utility clients in the East and Southwest.

His professional activities are legion and his connections as officer include Thomas Alva Edison Foundation, Engineers' Council for Professional Development, E.C.P.D. Committee for Accrediting Colleges, Edison Medal Committee and many others.

Fellow of the American Institute of Electrical Engineers, Mr. Morrow has been or is now chairman or member of many A.I.E.E. committees, representative of the institute on several professional bodies and A.I.E.E. delegate to World Power Conferences at Berlin and this year at Washington.

To many association meetings, conventions, engineering groups and university assemblies, Mr. Morrow has brought broader horizons, newer thoughts, authoritative discussion of current affairs relating to the electrical industry.

Through thousands of meetings with business men of the industry, through hundreds of discerning, timely editorials on these pages, through special articles in many journals, "Les" Morrow has gained for himself and his principles both respect and affection that color the fabric of the electrical industry in 48 states.

Ehrlich to edit "World"

Active editorial direction of ELECTRICAL WORLD will be in the hands of Howard Ehrlich, vice-president in charge of McGraw-Hill electrical papers. His long experience as an editor and publisher and his familiarity with the electrical industry and ELECTRICAL WORLD eminently qualify him to guide its editorial policies and practices. Many plans for improving the service of the magazine have already been approved and the competent direction of Mr. Ehrlich will supplement the efforts of the able and experienced editorial staff.

Use of Electricity to Grow—Carlisle

"My work is the production and sale of electric energy," Floyd L. Carlisle, chairman of Consolidated Edison Company of New York, told members of the engineering alumni association of the University of Toronto last week. "That work throws me in contact with all classes of industry, manufacturing, transportation operations, office buildings, apartments, farms and dwellings. I confidently foresee an increase in the use of electricity in the next ten years that will exceed the rate of growth of any previous period.

"Industry has started to modernize its equipment on a tremendous scale. Little expansion is as yet occurring to increase the capacity of plant, but this will start and carry on for a long period. The production of goods will increase, and the cost of production will decline. The consumer will be able to purchase this large increase at lower unit costs. His real income will be greater by reason of greater employment and the greater value of his services as he produces more goods."

Mr. Carlisle expressed the belief that in the next few years the field of housing will experience the greatest expansion in its history. Research has produced better materials, better design, economy of space, cheaper heating and air conditioning which will become a commonplace in all dwellings, he stated. Electrical machines in the home will literally abolish all but the slightest manual labor, Mr. Carlisle said.

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Cincinnati Gas to Spend $500,000 on Equipment

A permit to erect three boilers and other equipment to cost $500,000 has been issued to the Cincinnati Gas & Electric Company by Building Commissioner Clifford M. Stegner. The boilers will have a capacity of 717 hp. each and are to be installed in the company's generating station at 634 West Front Street, Cincinnati.

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More E.H.F.A. Contracts

Electric Home and Farm Authority on October 29 announced the closing of contracts providing for the financing of electrical appliance sales under the usual E.H.F.A. plan in the territories served by the Middle Tennessee Electric Membership Corporation of Murfreesboro, Tenn.; the Whitley County Rural Electric Membership Corporation, Columbia City, Ind., and the Board of Light and Waterworks, Marietta, Ga.

International

TEN-YEAR STREET-LIGHTING CONTRACT—President E. J. Doyle of Commonwealth Edison accepts ten-year contract to light Chicago's famous State Street. Left to right: E. J. Kelly, Mayor of Chicago; John P. Wilson, Deputy Commissioner Department of Public Works; Mr. Doyle; O. R. Hogue, manager lighting and wiring sales, Commonwealth Edison Company; Robert E. Peacock, director State Street Lighting Association; E. W. Lloyd, vice-president Commonwealth Edison Company; F. R. Atcheson, Elmer T. Stevens and Bruce McLeish of the Lighting Association

T.V.A. to Install Two Units at Pickwick

Regardless of the outcome of its negotiations for a permanent peace with the Commonwealth & Southern system, T.V.A. is betting on great increases in the valley's power consumption. The original plan to defer for an indefinite period the installation of generating equipment at Pickwick Landing Dam has been changed and T.V.A. now intends to make an initial installation of two units totaling 90,000 hp. at that point. This will bring the total installed capacity in dams now under construction to 573,400 hp. of the ultimate capacity of 1,858,000 hp. for these structures.

It is understood that T.V.A.'s ceramics research organization has finally evolved a graphite resistor for electric furnaces made by the electric firing of Appalachian kaolin. A number of these units are said to be undergoing the final test of commercial usage and are showing a life expectancy approaching 4,000 hours. If this product stands the test it will mean victory after a long experimental program carried on by T.V.A. in co-operation with the American Ceramics Society and with a number of manufacturers in this field.

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Spokane Utility to Build New Power Line

Survey work will start immediately for the right-of-way for a new 110-kv. line to be constructed between Tekoa and Garfield in eastern Washington by the Washington Water Power Company. The line will be 18 miles long.

"This new 110-kv. line will replace a 60-kv. line which was built about thirty years ago," stated J. E. E. Royer, vice-president and general manager of the company. "The completion of this line will give us a 110-kv. dual circuit serving the Palouse region south of Spokane," he said.

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States' Rights Upheld by Wisconsin Commission

Application of the Federal Resettlement Administration (R.A.) to become a public utility for the furnishing of utility services on its housing project at Greendale was denied last week by the Wisconsin Public Service Commission. The commission de-

clared that under Wisconsin law the federal government or any branch of it is prohibited from engaging in the utility business. The commission maintained that either the town of Greenfield, or Greendale, if it incorporates as a village, is eligible to become a public utility.

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Hughes Award Registration

Registration of utility companies for participation in the 1937 Hughes Award, one of the major awards of the Edison Electric Institute at its annual convention, closes on December 1, according to an announcement from E.E.I. headquarters in New York.

The Hughes Award consists of a cash award of $1,000 and a silver trophy, given annually by George A. Hughes, president of the Edison General Electric Appliance Company, for outstanding accomplishment in the promotion of electric cookery.

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Puget Sound Power's Rural Costs, Quarter Million

Expenditures this year for the construction of rural electric lines by the Puget Sound Power & Light Company will approximate a quarter of a million dollars, according to figures announced last week by S. P. MacFadden, vice-president.

Up to September 26 the company approved the construction of 489 rural extensions to serve 1,302 customers at an estimated cost of $202,540.

Three Court Actions Scheduled in Important Utility Cases

Scheduled for the coming week are court actions in three important utility cases testing governmental measures in the power field.

Two of these involve the Public Utility Holding Company Act of 1935, requiring the registration with the Securities and Exchange Commission of all holding companies engaged in interstate business and containing the famous "death sentence." The government's selected test case, directed against the Electric Bond & Share Company, is scheduled for oral argument November 11 before Judge Mack of the Federal District Court in New York. Although the constitutionality of the entire law is supposed to be at issue, the government is making vigorous attempts to confine the decision to the validity of the registration provisions only.

The second case involving the Holding Company Act is scheduled to be heard by the U.S. Supreme Court on November 9, and briefs have already been submitted by both sides. This is not a direct test of the validity of the law, but is an appeal of a lower court order directing an immediate trial of test cases brought by the North American Company and the American Water Works & Electric Company. Government attorneys sought to stay these cases until the Electric Bond & Share case should be finally settled, on the ground that they were being embarrassed by a multitude of suits on identical grounds. The stay was granted by the District of Columbia Supreme Court, but this decision was reversed by its Court of Appeals.

On the same day the highest court will hear arguments in the suit of the Duke Power Company against P.W.A. and Greenwood County, South Carolina, testing the authority of the federal government, through P.W.A., to make loans and grants for the construction of publicly owned power plants competing with private facilities. This right has been upheld by both the District Court and the Court of Appeals. The final decision is expected to determine the disposition of approximately 60 similar suits now pending in the lower courts under temporary injunctions.

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District Court Halts Grant

The District of Columbia Supreme Court this week issued a temporary restraining order against a proposed grant of $54,370 to the city of Winnemucca, Nev., by the Public Works Administration. The grant was announced by P.W.A. on October 21 and was a contribution to the city's proposed Diesel-generating plant and distribution system costing $120,800.

Application for the court order was made by Western States Utilities Company of Carson City, Nev.

OPENED THIS WEEK—The San Francisco-Oakland Bay bridge opened for traffic this week. Fifteen miles of roadway is sodium-lighted, part of which appears also at the right, leading to Oakland and Berkeley

Pacific Coast Has Two Fall Conclaves

Some 750 members of the Pacific Coast Electrical Association who attended the two fall conclaves—October 15-16, Hollywood, Calif., October 22-23, San Francisco—expressed themselves as well pleased with the system instituted there: Small discussion groups for specialized phases of the industry, general forum meetings for program and matters of policy.

With F. B. Lewis, vice-president and general manager of the Southern California Edison Company, president of the P.C.E.A., presiding, the first day's sessions at both meetings were devoted to small discussion groups covering business development, operating economies and administrative services.

Conclusions reached at the business development meeting were: (1) Utility leadership is essential for maintaining successful appliance leadership, whether the utility itself merchandises or sponsors a buy-through-the-dealer campaign. (2) Electrical industry kitchen planning bureaus are necessary for the success of the electric kitchen program. (3) Training the sales organizations of appliance dealers must be given attention. (4) The margin on electric ranges and water heaters is inadequate for successful merchandising to dealers, particularly department stores and other large retail outlets. (5) Sales of small appliances are suffering from the lack of local promotion to tie in with a national sales program.

In the operating economies meeting methods were discussed for balancing hydro-electric and steam-generating units, and modern plant maintenance methods were described in detail. Discussion on system reliability brought out interesting data on faster relay and circuit breaker operation, together with an indication of a general trend toward regrouping circuits and sectionalizing the system to reduce breaker duty and to improve continuity of service. At both meetings it was recommended that highway lighting experimental installations be given consideration as a means of promoting rapid adoption of this accident-prevention method.

In the administrative services group the new classification of accounts by the Federal Power Commission proved a source of grave concern to the accountants. It was recommended that both the meter deposit and the request for service forms be eliminated, together with second and third bills, substituting for the latter reminder bills, which would simplify the accountant's work.

Other groups discussed appliance service policies, purchasing and stores problems, adequate wiring. One point brought out was that the utility must continue to service electrical appliances, but, at the same time, must try to find means of shifting this work to other agencies. Closer co-ordination between the stores and the engineering departments was urged, to eliminate the stocking of items superseded by engineering specification changes.

Climax of both meetings was a symposium on the subject of maintaining leadership, a feature inspired by Mr. Lewis and presented under the leadership of R. M. Alvord, Pacific District manager of the General Electric Company, and W. C. Mullendore, vice-president of the Southern California Edison Company. In this symposium twelve members of the industry expressed their views on selling the electrical industry to the public and keeping it in its present dominant position.

Plans for an all-industry convention to be held in the spring of 1937 were announced, R. E. Smith, executive assistant Southern California Edison Company, being elected general convention chairman.

W. C. Mullendore

F. B. Lewis

Meetings

National Association of Railroad and Utilities Commissioners — Annual convention, Atlantic City, N. J., November 10–13. Clyde S. Bailey, secretary, 806-808 Earle Building, Washington, D. C.

American Society of Mechanical Engineers — Annual meeting, New York, N. Y., November 30–December 4. C. E. Davies, national secretary, 29 West 39th Street, New York, N. Y.

National Exposition of Power and Mechanical Engineering — Grand Central Palace, New York, N. Y., November 30–December 4.

Society for the Promotion of Engineering Education—Fall meeting, Middle Atlantic section, Columbia University, New York, December 5. A. Dexter Hinckley, assistant to the Dean, School of Engineering, Columbia University, New York, N. Y.

American Engineering Council—Annual meeting, Mayflower Hotel, Washington, D. C., January 14-16. Frederick M. Feiker, executive secretary, 744 Jackson Place, Washington, D. C.

American Institute of Electrical Engineers—Winter convention, New York, N. Y., January 25-29. H. H. Henline, national secretary, 33 West 39th Street, New York, N. Y.

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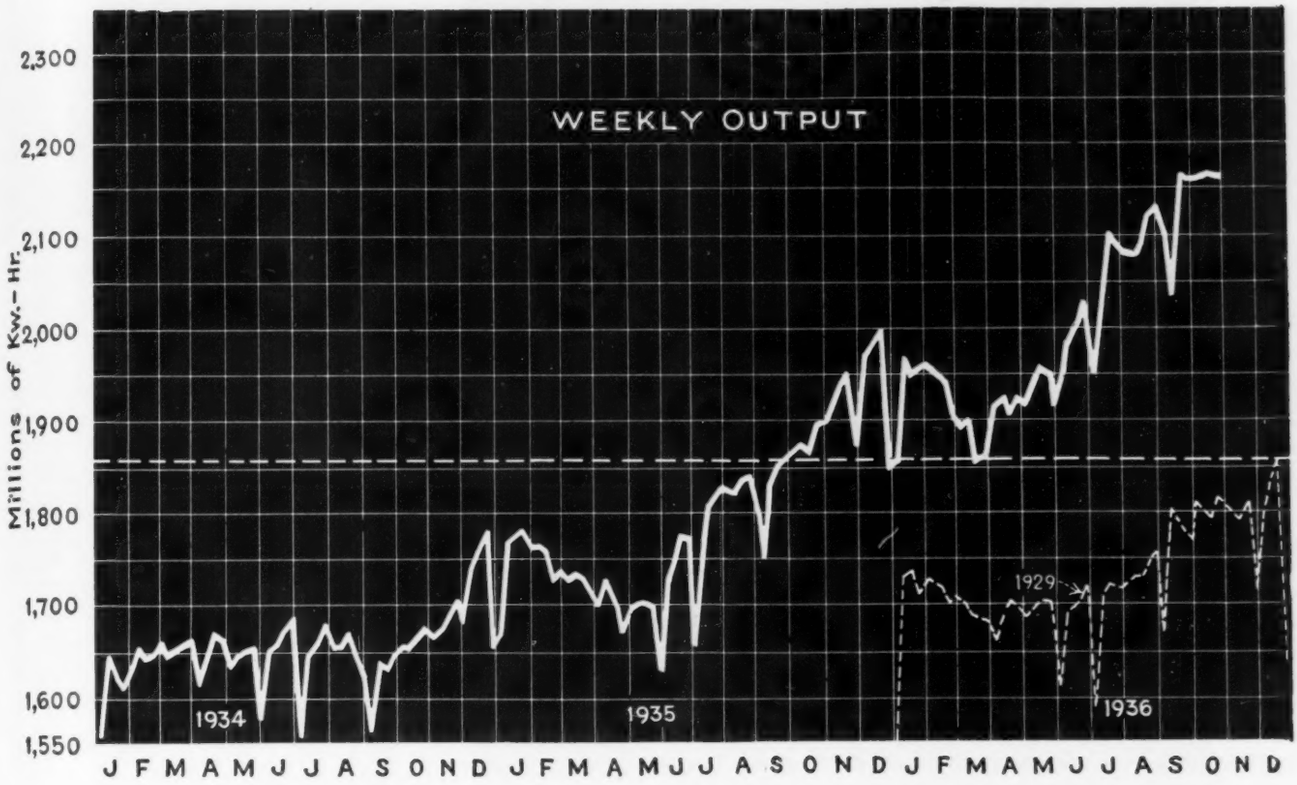
P.W.A. Announces More Power Loans

Announcement was made by the P.W.A. last week of the approval of 130 projects involving grants of $7,417,891 and loans of $989,000. Total construction cost is estimated at $16,454,804.

Power projects included: Niles, Ohio, grant of $79,479 for automatic substation, costing $176,479; New Bern, Tenn., grant of $26,000, loan, $33,000, total cost $59,000 for distribution system using T.V.A. power; Cabool, Mo., grant $22,900 toward $50,900 Diesel-generating plant, distribution system and street lighting; Ohio City, Ohio, grant $19,900 and loan $25,000 for $44,900 Diesel-generating plant.

Energy Output Resumes Rise



Production of 2,175,810,000 kw.-hr. in the week ended October 31 marks a new peak after six weeks of almost identical central station output, according to statistics announced by the Edison Electric Institute. This leaves a margin of 14.7 per cent over the amount produced a year ago, against 17.2 per cent in the week of September 19. The gain over 1929 was 19.0 per cent, and therefore very close to the rates recorded since midsummer, which have been persistently around 20 per cent.

In view of the characteristic seasonal rise of the lighting load it is to be inferred that the recent flattening of the output curve reflects a moderate recession in industrial energy.

Regional gains over a year ago show little change from the preceding week.

Weekly Output, Millions of Kw.-Hr.

1936	1935	1934
Oct. 31..2,176	Nov. 2..1,897	Nov. 3..1,669
Oct. 24..2,167	Oct. 26..1,896	Oct. 27..1,677
Oct. 17..2,170	Oct. 19..1,863	Oct. 20..1,668
Oct. 10..2,168	Oct. 12..1,867	Oct. 13. 1,657
Oct. 3..2,169	Oct. 5..1,863	Oct. 6..1,659
Sept. 26..2,157	Sept. 28..1,857	Sept. 29..1,649

Per Cent Change from Previous Year

Region	Week ended Oct. 31	Oct. 24	Oct. 17
New England	+ 9.7	+ 8.8	+ 9.8
Middle Atlantic	+13.1	+13.3	+15.0
Central Industrial	+18.4	+16.9	+19.2
West Central	+11.4	+12.9	+ 8.8
Southern States	+20.1	+18.4	+18.5
Rocky Mountain	+18.6	+14.9	+14.5
Pacific	+ 7.2	+ 8.5	+15.3
United States	+14.7	+14.3	+16.5

September Output Rises 18 per cent

Public utility plants generated 18 per cent more energy in September than in the like month a year ago. The Federal Power Commission, continuing publication of monthly statistics formerly reported by the U. S. Geological Survey, announces the total as 9,703,422,000 kw.-hr., of which 3,025,815,000 kw.-hr., or only 31 per cent, was produced from water power.

While total production was somewhat smaller than in August the average daily production was 3.0 per cent greater and was the largest for any month on record. The normal increase from August to September is 1.1 per cent. Production from fuels increased 29 per cent compared with a year ago. Total output for the first 9 months of this year is 14 per cent above the first nine months of 1935.

Energy Output, Public Utility Plants, September, 1936

Region	Output (Millions of Kw.-Hr.) Hydro	Fuel	Increase Over 1935 (Per Cent) Hydro	Fuel	Total
United States	3,026	6,678	+ 0	+ 29	+18
New England	167	461	− 5	+ 22	+13
Mid. Atlantic	470	1,990	− 4	+ 26	+19
E. No. Central	167	2,052	− 7	+ 22	+19
W. No. Central	103	501	−22	+ 28	+15
South Atlantic	411	711	−14	+ 57	+20
E. So. Central	307	151	+11	+159	+37
W. So. Central	12	522	−19	+ 24	+23
Mountain	280	92	+10	+ 36	+16
Pacific	1,109	198	+ 8	+ 33	+11

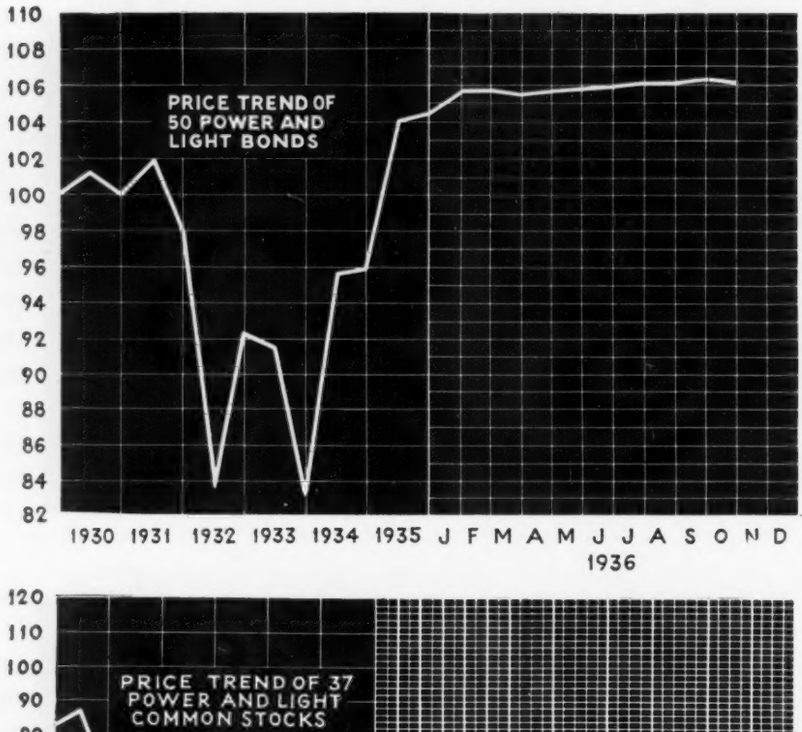
The quantities announced are preliminary and are subject to revision. They are based on the operations of all public utilities including railway and other plants as well as central stations. Regional quantities and changes compared with 1935 are shown in the table.

•

State Power Bills Defeated in the West

At the election held last Tuesday citizens of the state of Washington rejected the electric power initiative amendment. The vote stood at 57,000 to 32,000. Early returns made to the ELECTRICAL WORLD indicate that the state power bill was decisively defeated in Oregon.

Utility Bonds Firm; Stocks Lower



Industrial stocks gained on election news. Utilities declined slightly. "Electrical World" index, this week, 38.4; last week, 38.7. Utility bond prices changed but little in October. "Electrical World" index, 106.0; September, 106.2

Edison Holdings in Public Service

Commonwealth Edison Company, through its wholly owned underlying company, Commonwealth Subsidiary, purchased, during August, 16,232 shares of no-par common stock, 10,027 shares of $60 par common stock and 2,085 shares of 6 per cent preferred stock of Public Service Company of North Illinois. At the end of the month Commonwealth Subsidiary held 204,110 shares of no par, 37,160 shares of $60 par, 7,526 shares of 6 per cent preferred and 16,805 shares of 7 per cent preferred of Public Service issues.

This was revealed in the monthly report of S.E.C. covering transactions by directors, officers and large stockholders. The 241,270 shares of both classes held by Commonwealth Subsidiary represent 38.6 per cent of the combined shares outstanding on June 30 last.

•

General Gas Stockholders Authorize Proposed Plan

Stockholders of General Gas & Electric Corporation have authorized the creation of an issue of $5 prior preferred stock, enabling the corporation to carry out the terms of its proposed plan (ELECTRICAL WORLD, October 10, page 66).

Accordingly the public holders of the existing $6, $7 and $8 preferred stocks can exchange their certificates for the $5 prior preferred stock on the following basis: one share $5 preferred for one share of $6 preferred; 1 1/10 shares $5 preferred for one share of $7 preferred and 1 1/5 shares $5 preferred for one share of $8 preferred.

•

Commissions Set Utility Hearings

Federal Power Commission has called a public hearing for November 17 on the application of the Montana Power Company for authority to issue and sell $48,000,000 principal amount new and refunding first mortgage 3¾ per cent bonds, due 1966, and $10,589,500 principal amount 5 per cent debentures due 1966.

Florida Power Corporation, a member of the Associated Gas & Electric System, has filed a petition with the commission asking it to modify its order of June 16, 1936, authorizing the company to issue $12,000,000 first mortgage 4½ per cent bonds, due in 1976. The company now seeks authority to issue instead $10,000,000 first mortgage 4 per cent bonds, due in 1966, and $2,500,000 5 per cent sinking fund debentures due in 1946. Public hearing has been set for November 16.

S.E.C. has called a hearing for November 14 on the application by the Middle West Utilities Company of Canada, Ltd., a subsidiary of Middle West Corporation, for exemption and the exemption of its subsidiaries from holding company provisions of the Public Utility Act.

On November 11 a hearing will be held on a similar application by the Utilities Power & Light Corporation, Ltd., of Canada, a subsidiary of the Utilities Power & Light Corporation.

•

H. L. Clarke Retires from Utility Post

Harley L. Clarke of Chicago has retired from the presidency of the Utilities Power & Light Corporation, the $400,000,000 electric power system that he founded more than twenty years ago. Mr. Clarke has been in conflict with the Atlas Corporation, which acquired a dominant position in the utility company more than a year ago by buying from the Reconstruction Finance Corporation certain securities through which control of Utilities Power & Light is owned. Mr. Clarke will continue to act as a director of the company.

Manufacturing AND MARKETS

Westinghouse Wins Million-Dollar Government Refrigerator Order

P.W.A. accepts bid for 16,697 electric refrigerators on bid which includes ten-year guaranteed operating cost

To Westinghouse Electric & Manufacturing Company was awarded the million-dollar government contract for 16,697 electric refrigerators to be used in housing projects, it was learned last week by ELECTRICAL WORLD at the Westinghouse plant at Mansfield, Ohio.

Eight manufacturers had been interested bidders for the order, unusual not only for its size but because the bid was to include a guaranteed consumption and operating cost over a period of ten years.

Use 1.32 kw.-hr. per day

Manufacturers were asked to submit "evaluated" bids, consisting of a unit price for the refrigerator plus a guaranteed operating cost for a ten-year period assuming electricity cost the customer 1 cent per kilowatt-hour.

The Westinghouse bid, accepted as it was the lowest tendered, was $67.63 for the refrigerator, plus $48.18 as guaranteed operating cost, a total of $115.81. It is seen each unit is guaranteed to consume not more than 4,818 kw.-hr., 482 per year, 1.32 per day of 24 hours.

The order totals $1,129,223 and includes 16,697 refrigerators for 34 housing projects of P.W.A. Net storage space for the unit is 4 cu.ft. Delivery is scheduled for the December 1, 1936-October 1, 1937, period.

Largest single delivery will be to New York City's Ten Eyck houses, where 1545 of the refrigerators are to be delivered August 1, 1937.

LOOKING AT THE LATEST—Seventy-eight electrical manufacturers displayed their newest products in Chicago for last month's exhibit sponsored by the Electrical Association for the Electrical Maintenance Engineers

•

$3,580,813 Earned by Allis-Chalmers

Allis-Chalmers Manufacturing Company reports for the nine months ended September 30, 1936, net income of $3,580,813 or $2.30 a share on 1,558,090 no-par shares of common stock outstanding on that date, after charges including debenture interest, depreciation and normal federal income taxes, but before provision for federal surtaxes on undistributed income, as the latter cannot as yet be definitely determined. This compares with a net income of $1,374,919 or $1.03 a share for the first nine months of 1935 on 1,335,326 shares outstanding as at September 30, 1935.

Billings for the nine months of 1936 were $44,149,060, compared with $27,468,984 in the corresponding period of last year, an increase of $16,680,075 or 61 per cent. Orders booked in the nine months of the current year amounted to $47,786,152, an increase of $19,225,238 or 67 per cent over the $28,560,913 bookings in the same period of 1935. Unfilled orders on September 30, 1936, totaled $11,147,684, compared with $9,105,788 on September 30, 1935, an increase of $2,041,896 or 22 per cent.

Net income for the quarter ended September 30, 1936, was $1,492,212.

•

August Exports $7,734,782

Exports of electrical goods during August were valued at $7,734,782, according to advance data announced by the Department of Commerce. Nine foreign countries took goods valued at more than $250,000, as fol-

lows: Canada $1,111,046, Union of South Africa $1,038,008, United Kingdom $660,824, Mexico $500,796, Brazil $367,286, Argentina $351,356, Cuba $283,619, Soviet Russia $269,934, France $269,231.

•

Rocky Mountain Area to Stage Jubilee

Inspired by last year's unprecedented Christmas appliance business, largely induced by Electrical Jubilee Week, the electrical merchandisers of the Rocky Mountain area have again united for a similar business-capturing activity during the period November 30 to December 24.

The Electrical League of Colorado, the Denver *Post* and the Rocky Mountain Electrical Association will again sponsor the project. Distributors, utilities, dealers, contractors and manufacturers have already pledged participation and co-operation. Approximately $25,000 will be expended by the participants to stimulate Christmas trade.

The Rocky Mountain program will have the support of a powerful national advertising campaign, the feature of which will be national Electrical Housewares Week, December 7 to 12. The activity will be built around a series of appliance shows and lighting expositions.

•

Kelvin Home Inaugurated

Formal presentation to the American public was made recently of the completely air-conditioned and electrified Kelvin Home, Kelvinator Corporation's new contribution to American home building standards. Presentation ceremonies took the form of a luncheon tendered by the Kelvin Home Celebration Committee to local, state and national leaders in business, industry, public health, building, architecture and home economies, at the Detroit Athletic Club. Both Governor Fitzgerald and Mayor Couzens are members of the committee.

New York Metal Prices

	Oct. 28, 1936 Cents per Pound	Nov. 4, 1936 Cents per Pound
Copper electrolytic	10 00*	10.00*
Lead Am. S. & R. price	4.70	4.80
Antimony	12 00	11.75
Nickel ingot	35.00	35.00
Zinc spot	5 225	5.225
Tin Straits	44 60	45.85
Aluminum, 99 per cent.	19—21	19—21

* Delivered Connecticut Valley.

Field Reports on Business

Election repercussions on business turned out to be favorable. The fall upturn is expected to continue and early reports indicate a post-electric spurt in steel, automotive, mining and other basic industries. Electrical manufacturers and utilities are busy with budgets and all reports show an expected increase in sales and expenditures. Manufacturers are making purchases of supplies for next year's needs and expect present price levels to be on the upward trend with most products. Recent earnings reports are splendid.

NEW ENGLAND

New England orders during the past week have been steady. Small motor sales in this district are strong. One manufacturer records orders for more than 900 hp. in small motors; motors for pumping service have been selling well and have more than doubled in number as compared with the period to date for last year. Fractional-horsepower motor sales have been brisk, with appliance manufacturers active in the market. According to one source, inquiries on the desks are at a peak volume at this time. Interest in power equipment is spread over a wide range from motorization in new plants to additional power-generating machinery among some of the utilities.

In the central station supply field orders for network transformers have been prominent; one representative reports increasing sales of automatic control apparatus; small switches are in good demand. Wiring contracts for fire-alarm systems are among one of the outstanding fields in which special electrical supplies are attracting attention. A new fire-control station is soon to be erected in Everett, Mass., at a cost of $48,000; construction of a new broadcasting station for police service in Fall River, Mass., has been planned.

Merchandising moves steadily. One contractor reports a slight stalling in new air-conditioning supply sales, but new residential buildings in the suburban districts are being projected in good volume. From reliable sources comes information of shortages of skilled labor, a condition that is beginning to hamper seriously deliveries of electrical equipment. To meet demands employment is running high. The General Electric plant at Pittsfield, Mass., is at present employing double the force of a year ago.

NEW YORK

Despite election week, business kept up in volume. Several large orders for electrical equipment were placed and others are in negotiation. Purchases of steel, copper and other supplies for next year's production are being made by electrical manufacturers. Utility headquarters are busy with budget approvals and expenditures are to be increased greatly. Financial heads are making plans for security issues to raise the money. Electric output has held level, but is now expected to spurt upward because of the late fall business.

Retail sales of electrical appliances are anticipated in large volume for this Christmas and stocks are being filled rapidly. Distribution apparatus purchases by utilities continue and several negotiations are being made for generating and transmission equipment. Some hesitancy exists as to the election effects on security markets and on capital loans, but several large industrials state a go-ahead program that should make earnings reports better than ever. Net income statements of operating utilities show gains in net income ranging up to 400 per cent. Despite doubt as to political aspects for the electrical industry, it is making its business plans to go forward.

CHICAGO

An especially encouraging item last week was the announcement by the Chicago District Electric Generating Company to spend $5,100,000 to complete unit No. 2 of the huge State Line Station. This is the first addition to generating capacity in the Chicago area since 1932 and means that local utilities, rising out of the depression slump, can see ahead of them a need for more generating capacity than present plants will provide.

Virtually the entire industry is still highly optimistic as activity in all lines steadily increases. The lighting equipment group reports a larger number of commercial and industrial installations and a satisfactory demand for portable lamps. The demand for industrial equipment is exceptionally good. Wire and cable sales are far ahead of last year. One order was placed last week for 20,000 lb. No. 6 weatherproof line wire.

Seventy per cent of the manufacturers reporting to the Chicago Electric Association show an increase in sales over the previous month, while 98 per cent show a gain over last year.

PACIFIC COAST

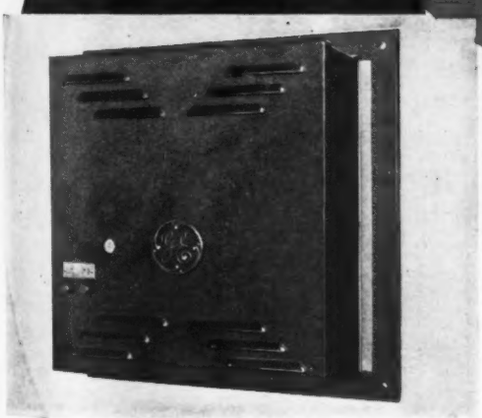
The shipping strike situation overshadows every other coast topic. Pacific Coast and transoceanic shipping is paralyzed because of the maritime union strike which occurred, despite predictions, several days before election. Thus far all commodities except foodstuffs are moving by rail and truck. Though many projects on the verge of release have been held up pending strike settlement, the natural demand keeps its momentum and local business is still excellent. This demand, plus emergency purchases, produced a record-breaking November.

Virtually every power company on the coast has established a new all-time daily demand record this year, although industrials are still far from capacity. Major appliances such as refrigerators and water and air heaters are largely responsible, as well as the steadily mounting load through improved lighting and new electrical uses such as dehydrating fruit, frost protection, brooding and soil heating for plant propagation.

Opening of the Bay Bridge for interurban rail traffic is scheduled for May, 1938, and, therefore, early next year purchases totaling about $500,000 for trains and cars and $200,000 for substations will be made. Electrical manufacturers report crowded coast plants and heavy payrolls in effort to cope with demand for motors and transformers, this demand being abnormal in its duration, territorial extent and lack of sizable individual orders.

"Either way you use it, you can INSTALL THIS NEW BREAKER AND FORGET IT"

Breaker with cover removed



A new enclosed air circuit breaker, sturdy and compact, with a-c or d-c electrically operated mechanism mounted within the breaker enclosure. This new air circuit breaker is made to withstand thousands of operations without maintenance. Its simplicity and compactness make it an ideal breaker for general industrial and station-auxiliary service.

1. FREQUENT OPERATION

If it must operate frequently, its new interrupting element and its alloy arcing contacts will assure trouble-free service.

2. INFREQUENT OPERATION

Even though it operates only once in a while, its silver-to-silver main contacts will stay cool.

Ratings are 15 — 600 amp, 250 volts, d-c; 600 volts, a-c; interrupting rating 20,000 amp. Ask your G-E office about the Type AE-1. General Electric, Schenectady, N. Y.

200-4

GENERAL ELECTRIC

3 Developments

OILTIGHT JEWEL SCREW

•

NEW JEWEL OIL

•

COBALT-TUNGSTEN PIVOT

THAT MEAN LONGER LIFE For Your G-E Watthour-meter Bearings

THE OILTIGHT JEWEL SCREW FOR LONG-TIME LUBRICATION

The life of G-E watthour-meter bearings has again been increased, with the development of the oiltight jewel. Not only does this hold the oil, but by means of a reservoir it keeps the jewel surface always covered with a protective film. The long-time lubrication obtained reduces maintenance cost and improves the long-life performance of your watthour-meter bearings.

The design is simple—an assembly of only three parts—a main screw, a jewel plug, and a guide sleeve. Because of this simplicity, inspection and assembly are easy. Although this bearing is interchangeable with the older bearings, there is no increase in price.

JEWEL OIL FOR PROPER LUBRICATION AT ALL TEMPERATURES

A new meter oil has also been developed. So fine are its temperature-viscosity characteristics that indoors or outdoors—from summer's heat to winter's cold—adequate lubrication of the lower bearing is assured. There is almost no gumming or drying out of the oil—pivots and jewels are lubricated under all operating conditions. To assist you in filling the jewel with oil, a dropper is attached to the cap of each oil bottle.

THE COBALT-TUNGSTEN PIVOT FOR INCREASED BEARING LIFE

And there is still another development—the cobalt-tungsten pivot. It, too, represents a definite step toward BETTER metering.

The cobalt-tungsten pivots are relatively unabrasive as compared with steel pivots and result in less jewel wear even under adverse conditions. As they are somewhat softer than the hardened steel pivot, shocks and vibrations are less severe upon the jewel. Thus the entire bearing receives better protection. You obtain a longer jewel life, decreased maintenance expense, and a reduction of lost revenue.

A groove on the brass setting makes identification easy.

These three features—oiltight jewel screw, meter oil with wide temperature range, and cobalt-tungsten pivot—are now standard in all G-E watthour meters. They are also available as renewal parts. For further information, get in touch with your nearest G-E salesman. General Electric Company, Schenectady, N. Y.

400-22

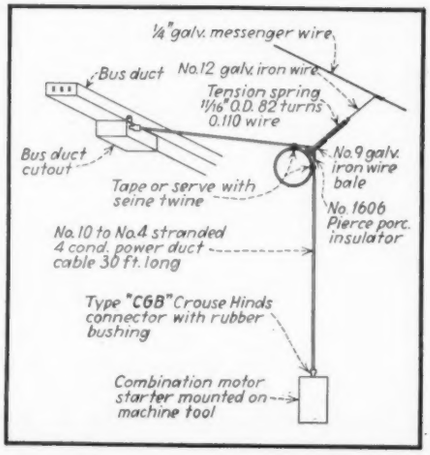
GENERAL ELECTRIC

New ENGINEERING IDEAS

Discoveries, proposals and developments by electrical engineers and scientists in the field, the factory and the laboratory

Simple Wiring Scheme Promotes Flexibility

An extremely flexible form of distribution service for machine tools has been adopted by the Detroit plant of the Packard Motor Car Company which has advantages invaluable to other industries. As is the case in any plant where an attempt is made to group related operations in proper production sequence, circuit capacity in this plant had to be available for any load at any point in the shop. Branch circuits to individual machines had to be such that they could be readily adapted to relocation of machines. These requirements were imposed to give maximum flexibility in manufacturing facilities through regrouping or addition of machine tools.


¼" galv. messenger wire
Bus duct
No.12 galv. iron wire
Tension spring 1⅛" O.D. 82 turns 0.110 wire
Bus duct cutout
No.9 galv. iron wire bale
Tape or serve with seine twine
No.1606 Pierce porc. insulator
No.10 to No.4 stranded 4 cond. power duct cable 30 ft. long
Type "C6B" Crouse Hinds connector with rubber bushing
Combination motor starter mounted on machine tool

Method of supporting flexible cable in distribution circuit at Packard factory

Flexible cables from overhead bus permit relocation of machine tools in auto factory

Primarily the system consists of overhead power ducts which may be tapped at any point for attachment of flexible circuits to each individual machine. From each power duct and branch service duct cable is run horizontally to a point over the machine served. Here it is coiled in one or more loops, supported, as shown, by a spool type insulator and then dropped vertically to a machine tool control box. The taut horizontal span and the almost vertical drop are produced by the coiled spring support of the cable loop over the machine. Fittings at the power duct and the machine control box grip the cable so it cannot slip or creep. Among the features of this type of system is its low installation cost. Four man-hours were required per individual machine circuit for installation.

"Powerduct Cable," made by the Anaconda Wire & Cable Company, was selected for the flexible circuit. Aside from flexibility it has a special coating said to resist deterioration by oil, grease, gasoline and acid. The cable contains three stranded, rubber-insulated "Safecote" conductors and one bare ground wire. All four conductors are cabled round with jute fillers, over which is an impregnated cotton woven covering.

This wiring system was devised by L. R. Bogardus of the Packard Motor Car Company and is used in the plant devoted to manufacture of the "One-Twenty" low-priced model.

The Manufacturer's Bulletin Page

KEARNEY
Hi-Line Equipment News

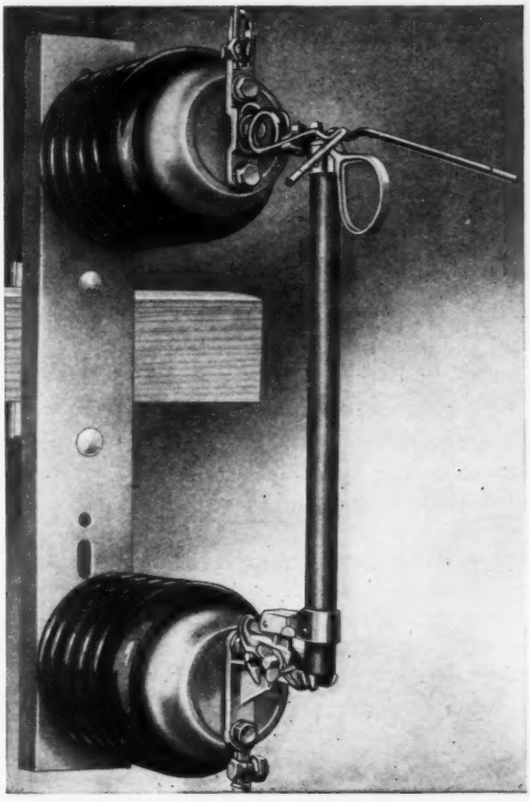
NEW PRODUCT INFORMATION

Latest News | St. Louis, Mo., Nov. 1936 | World Copy

STATION POST INSULATORS—POINT PRESSURE CONTACTS—FEATURE 100 AMP. TRIP OUTS

Pin and Cap Type Insulators, Formerly Standard, Now Optional Since Demand for Modern Insulators

Freedom from Radio Interference One of Six Important Advantages



THE adoption of Station Post Insulators as standard for the Kearney line of 100 ampere Trip Out Fuse Switches has been heartily approved by operating men everywhere who have had occasion to study the advantages of these insulators in comparison with the pin and cap type, formerly used, which are still obtainable but on optional order.

Among the outstanding characteristics which these insulators possess are: freedom from puncture; ability to withstand arc-overs; ability to handle dirt conditions; freedom from cracking; exceptional rigidity; high resistance to impact; neat appearance and freedom from radio interference at their rated normal voltage with a substantial margin of safety.

Other Features Retained

Point pressure contact, a feature which since its inception has been found highly practical; Kearnite fuse tubes; hinge contacts of proved design for positive operation, and other superior features are all incorporated in this line of 100 ampere fuse switches which are available in the following voltages: 7500/12500Y, 15,000, 23,000, 33,000S and 34,500, and cataloged respectively, 6444, 6445, 5759, 6443 and 5764.

Insulator fittings of these switches are attached to 3-inch bolt circle cap in such a manner that the insulators may be conveniently removed or replaced, provided they are standard N. E. M. A. insulators with 3-inch bolt circle.

Channel bases are made of heavy galvanized steel channel iron to conform to A. S. T. M. specifications. Mounting holes will be provided to conform to special template when furnished.

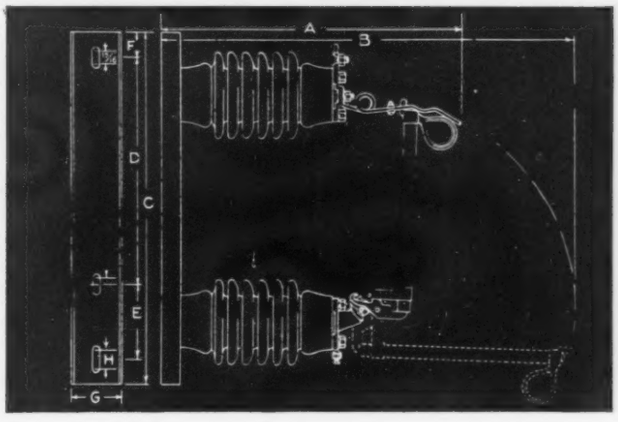
Further information and prices of these Trip Outs may be had by addressing the James R. Kearney Corporation, St. Louis, Mo.

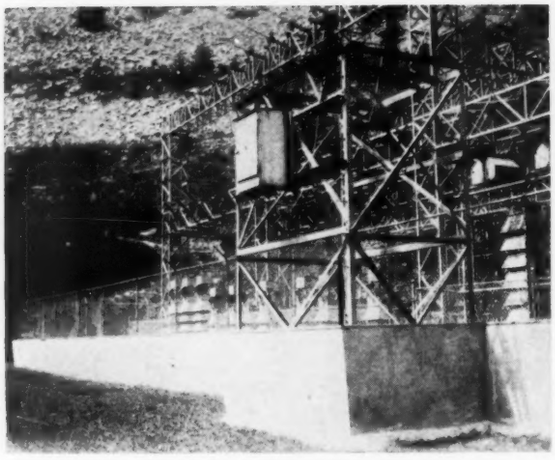
JAMES R. KEARNEY CORPORATION
4224-42 Clayton Ave., St. Louis, Mo.—*Canadian Plant*, Toronto

100 AMP. TRIP OUT FUSE SWITCH

Cat. No.	RATING		DIMENSIONS—Inches							
	Volts	Amps.	A	B	C	D	E	F	G	H
6444	7500 12500 Y	100	18¼	22½	28	18	6	2	4	1½
6445	15,000	100	20¾	28	28	18	6	2	4	1½
5759	23,000	100	24¾	33¾	28	18	6	2	4	1½
6443	33,000 S	100	28¾	40¾	36	24	6½	2¾	5	15/16
5764	34,500	100	30¾	40¾	36	24	6½	2¾	5	15/16

USE KEARNEY QUICK-ACTION FITALL FUSE LINKS





Sheet metal and concrete ostracize snakes

The barrier consists of sheet metal 3½ ft. high, reinforced at the vertical seams, and horizontally along the top with small angle members, and is braced at the top to the fence. The vertical members are set in concrete, and a small trench was dug the entire length and filled with concrete, to prevent snakes from going underneath. The barrier is inclined outward.

Barrier Keeps Snakes Out and Switches In

By E. W. BROWN
Director of Operations and Chief Engineer
Kentucky Utilities Company, Lexington

The Dix Dam hydro-electric station, its transformer and switching station, is located near the base of a rock-filled dam 275 ft. in height, which impounds the waters of Dix River, forming Herrington Lake, and provides power to generate a large portion of the electrical requirements of central Kentucky. The switching station controls two double-circuit and one single-circuit 66-kv. lines and three 33-kv. lines, together with necessary transformers. The huge rockfill and the adjacent rugged cliffs provide a home for snakes and groundhogs.

The Somerset, Ky., *Journal* described one of the several instances where serious interruptions were caused by the reptile inhabitants of the dam structure thus:

Fifty Towns Put in Darkness by Hungry Snake

Crawls Out on 13,000-Volt Wire at Dix River Dam and Causes Trouble

Was Hunting for Birds, Report of Officials

Many of our customers were rather skeptical about the snake "alibi," it being one of the earliest ever invented, and a common one among fishermen and others, when desiring to indulge in their favorite snake-bite remedy. The pictures indicate clearly the method adopted and installed to keep the snakes out of the garden and trouble.

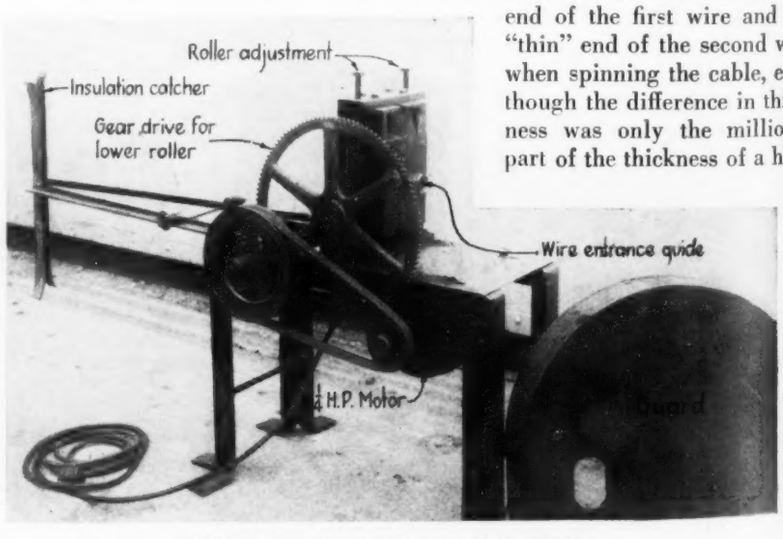
Since installation, no further trouble from snakes has occurred and no snakes have been observed within the inclosure. Prior to installation numerous snakes had been killed within the substation by attendants, in addition to those that were electrocuted.

•

Motor-Driven Wire Stripper

By CARL R. WENZ
Assistant Superintendent of Construction,
Oklahoma Gas & Electric Company

Possible later use of No. 4 and No. 6 bare copper wire for secondaries has led to the development of an insulation stripping device which removes weatherproof insulation from junk wire. The stripping machine is composed of two 3½-in. cast-iron rollers gear driven by a ¼-hp. motor. Steel rollers were given a trial, but were not as effective as cast iron for crushing the insulation from the wire. Roller clearance is adjusted so it will be just sufficient to allow insertion of the bare wire. The crushed insulation is readily separated from the wire by the insulation catcher, which deposits it directly in front of the machine. Insulation is removed at the rate of 60 ft. per minute with a normal roller speed of approximately 60 r.p.m.



Machine strips weatherproof insulation

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Twisted Core for 220-Kv. Conductor

The voltage of 220 kv. used in Sweden for the first time on the transmission line from Krangede to Stockholm resulted in development of a hollow-core construction for conductors, according to *Electrician* (London).

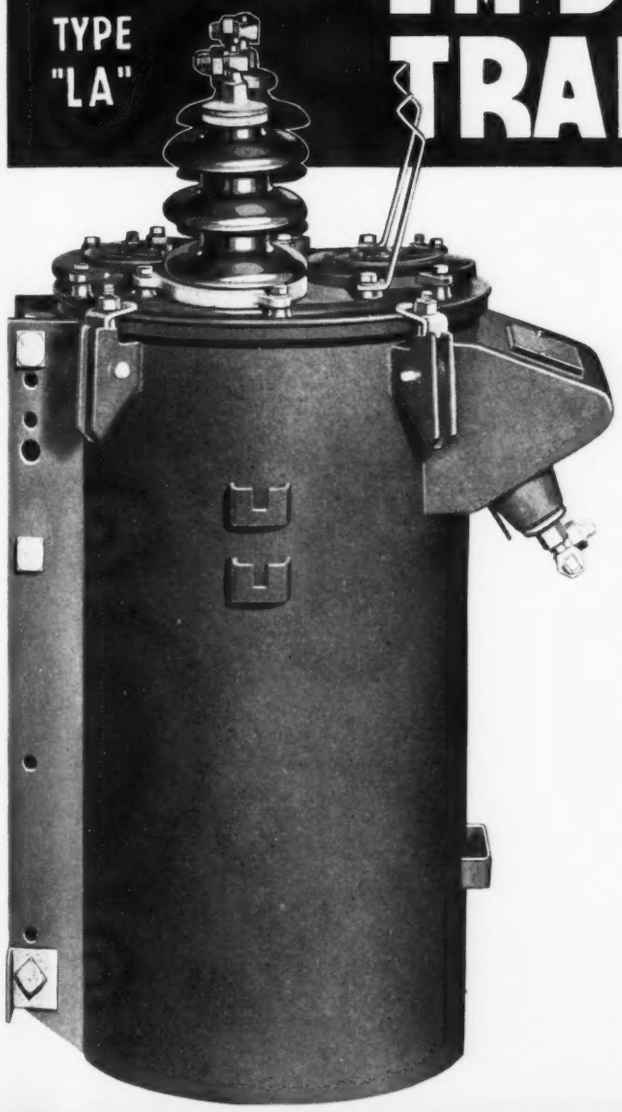
For one section of the line—that part from Krangede to Horndal—copper tapes approximately 1,000 yd. long and 0.59 in. wide were made and twisted into corkscrews with an exact pitch of 50 mm. A cable-spinning machine wrapped this core with a layer of copper wires 2.43 mm. in diameter, spun in the opposite direction to that of the spiral. A layer of 28 wires completed the conductor, which has a final diameter of 25 mm. Less copper is needed to carry the current on to Stockholm, so a single layer of wires is wrapped around the twisted core, which here has a width of 0.75 in.

All wires of the conductor were required to be of uniform diameter and strength with minimum space between adjacent wires. When the separate wires, each 1,000 yd. long, were finally formed by being drawn through a die, the last part of the wire was a little thicker because of the wearing of the die. The demands on the uniformity of thickness of the wires were so great that care had to be taken to use the "thick" end of the first wire and the "thin" end of the second wire when spinning the cable, even though the difference in thickness was only the millionth part of the thickness of a hair.

NEW

L-M DISTRIBUTION TRANSFORMERS

TYPE "LA"



ADVANCED DESIGN!.. Based on suggestions from operating engineers and developed by L-M research.

IMPROVED FEATURES!.. High bushing coordination, high surge resistance, long, trouble-free service, low maintenance cost.

CAREFUL ASSEMBLY EXTRA care throughout coil winding, core construction, assembly. Every step double-checked.

THOROUGH TESTING Experienced operators using accurate equipment perform more than routine tests.

A COMPLETE LINE.. 1½ to 25 Kva in round tanks. 37½ to 200 Kva in rectangular tanks. Ratings of 2400, 4800, 6900, 11,500 and 13,200 volts.

FULL INFORMATION!.. Write to Line Material Co., South Milwaukee, Wisconsin, for the new L-M Transformer Bulletin LMB-6364.

LINE MATERIAL CO.

Industrial ELECTRIFICATION

New ideas and practices in industrial electrification as presented by industrial, consulting and power sales engineers

Photo-Cell Control for Casting Wheel

To obtain a smooth surface on copper billets that are to be drawn into wire care must be taken during casting to insure against disturbing the molten copper in the molds as they pass under the pouring spout. Molds mounted on a large copper casting wheel at the Perth Amboy plant of the American Smelting & Refining Company are uniformly decelerated and stopped accurately under the pouring spout by a unique photo-electric control system that relieves the operator of a tedious and painstaking job. This present system makes it possible for the operator to spot molds to within 1/8 in. by merely pushing a control button.

Two photo-cells are used. Interruption of the first light beam as the casting wheel turns on its vertical axis to bring a new mold into position starts the regenerative braking, thus slowing down the wheel uniformly. As the wheel reaches the exact position under the pouring spout the second beam is interrupted, setting a magnetic brake and stopping the wheel. When the mold has been cast the operator presses a master button and the cycle is repeated for the next mold.

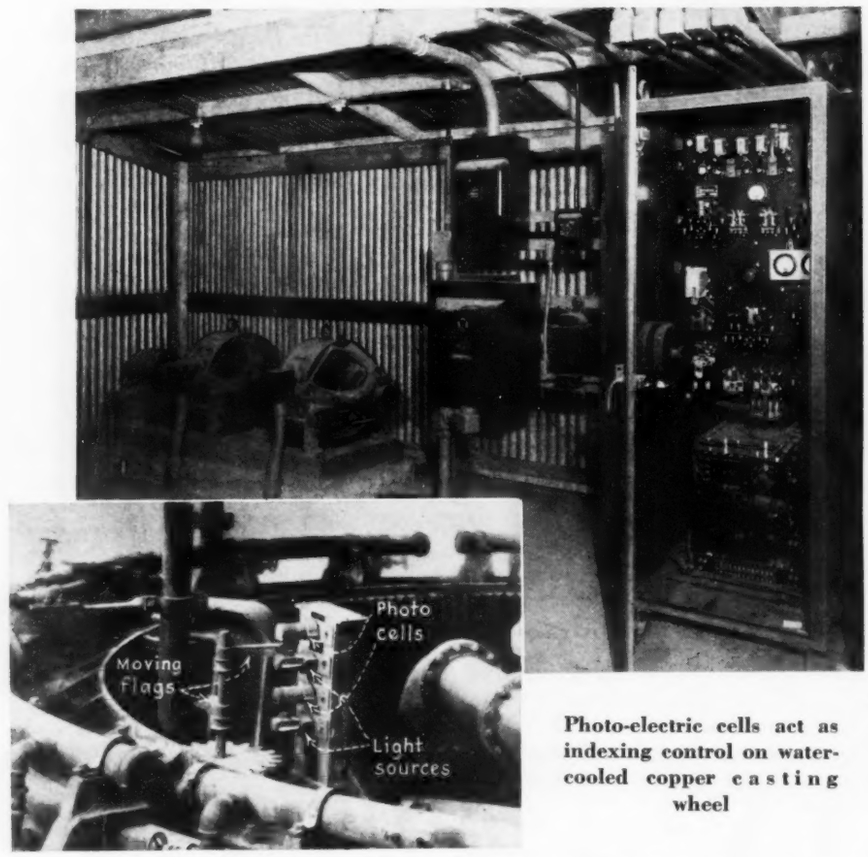


Photo-electric cells act as indexing control on water-cooled copper casting wheel

Interruption of the first light beam acts to vary the voltage supplied by a motor-generator set to the twin 10-hp. motors driving the casting wheel. This is accomplished through a motor-driven rheostat which varies the field of the generator. Interruption of the second light beam sets a magnetic break.

•

Check Circuit Contacts When Motor Overheats

By K. B. HUMPHREY
Sayreville, N. J.

When one leg of a three-phase motor supply has extraneous resistance inserted in it the motor may continue to run. The excess current in the other wires may not be enough to trip the protective device, though it can cause considerable local overheating. Such a case is not so uncommon as might be supposed. In one case a small 2-hp., 220-volt, three-phase induction motor used on a grinding wheel began to overheat badly. The motor started all right, showing that there was no open circuit, and the load was the same as it had been carrying right along. Guessing that the motor had become clogged with dust, it was disassembled and thoroughly cleaned out. It was tested out in the shop and worked perfectly. Yet, when it was returned to the job, the same overheating took place.

The trouble was finally located in the branch fuse box. Fuse connections had become corroded and poor contact was being made in one phase wire. When the machine was running there was enough vibration to cause a considerable voltage drop and at times an open circuit. By sandpapering the contacts and going over

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by the best people

In the most up-to-date plants in America with planned and routed production is where Modern Group Drive shines. This newer of the two standard methods of applying motor-power to production machines steps up efficiency — and *how* it saves money. Are you using this modern power transmission system that is rapidly replacing old-fashioned line shafts and ill-advised small motors?

★ ★ ★

The older way of applying motor power too often has meant putting a motor on each machine, *regardless* — involving high investment costs and high operating and maintenance expense. The newer way—Modern Group Drive—using large motors for *groups* of machines, and small motors where needed for single machines — is usually more efficient, particularly with planned production. It is *always* far cheaper to install, to operate and to maintain.

For example, with Modern Group Drive you use a larger, more efficient motor with better power factor. You pay from 35% to 85% less per motor horsepower. You buy less motor horsepower for a given number of machines. You get, with properly planned production, the lowest cost of power *delivered to the machines.*

SEND FOR FREE BOOKLET

Our Red Book talks your language and tells with pictures and brief text why and where Modern Group Drive is more efficient and economical. Send for a copy today. Case studies are also yours for the asking. And at your call, without obligation, are Power Transmission Counselors throughout the country who co-operate with plant, consulting and public utility engineers in the modernization and installation of industrial power transmission systems.

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75 STATE STREET · BOSTON, MASSACHUSETTS
A research association of producers and distributors of power, power units and mechanical equipment for transmitting power.

MODERN GROUP DRIVE
–the new efficient and economical way of transmitting power to machines

all the connections the whole circuit was put in shape and no further trouble was experienced.

When a circuit is not used continuously the contacts seem to corrode more than when in use and it is now customary to go over all the connections at regular intervals.

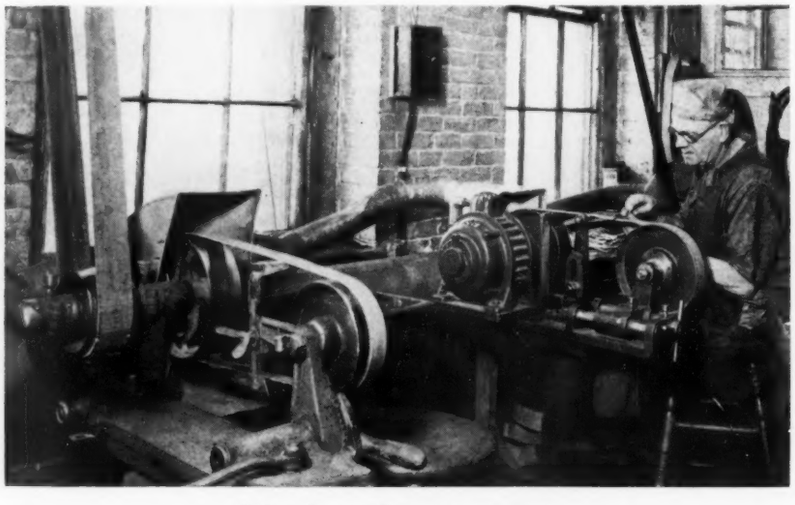
In the case of a pump motor a loose connection in the cable was found, probably due to some one tripping over it, where a splice had been made. The overheating in this case was not great, but the motor ran above normal for the load it was carrying. Naturally a loose connection could be found by means of a voltmeter, but in many cases there is no suitable place for reading the voltage and it may be quicker simply to go over the line and tighten things up.

•

Individual Drive Found Smoother

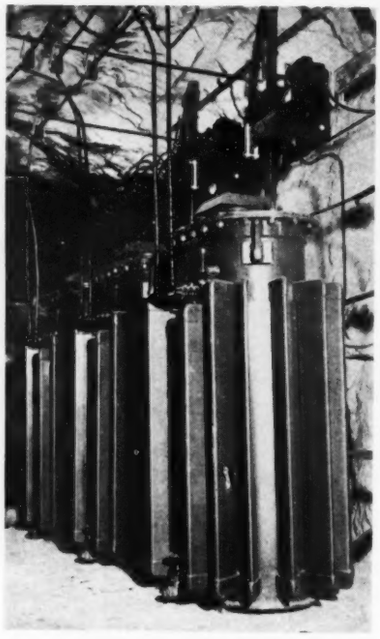
Ten belt polishing lathes will be motorized at the silver manufacturing plant of Reed & Barton, Taunton, Mass., because the results of an initial installation shown herewith were so satisfactory to the management. The old method of driving is visible at the left and the latest practice is seen at the right. In this department polishing is done between the tines of both sterling and plated forks, and fine facing of spoons is also handled. The earlier method utilized group drive, each machine having a 2-in. abrasive belt running between pulleys and having a step-by-step adjustment for tightening. Bearings were not sealed and frequently became overheated and badly worn from accumulation of emery dust. Maintenance costs were high. Overhead shafting also interfered with the supply of natural light on this close work.

Individual drive includes a 1-hp. induction motor (S. A. Woods) running at 1,800 r.p.m., 550 volts, three-phase design. Sealed ball bearings are provided, with a screw adjustment of belt tension. The set-up is compact and energy need be consumed only while work is being done. Clearances are improved, lighting conditions bettered. Graduated adjustment of belts facilitates high production continuity.



Old and new drives in contrast

SAVES EXPENSE OF VAULT



Pyranol-filled transformers saved the North Star (Calif.) mine management the expense of installing a fireproof transformer vault when a modernization and expansion program called for a new underground distribution center. These three units, each rated 150 kva., 1¼ kv., use General Electric's non-inflammable insulating liquid instead of oil. This enabled them to be installed in a room carved out of rock at the 4,000-ft. level. Fire hazards are eliminated and installation costs are reduced with this modern equipment

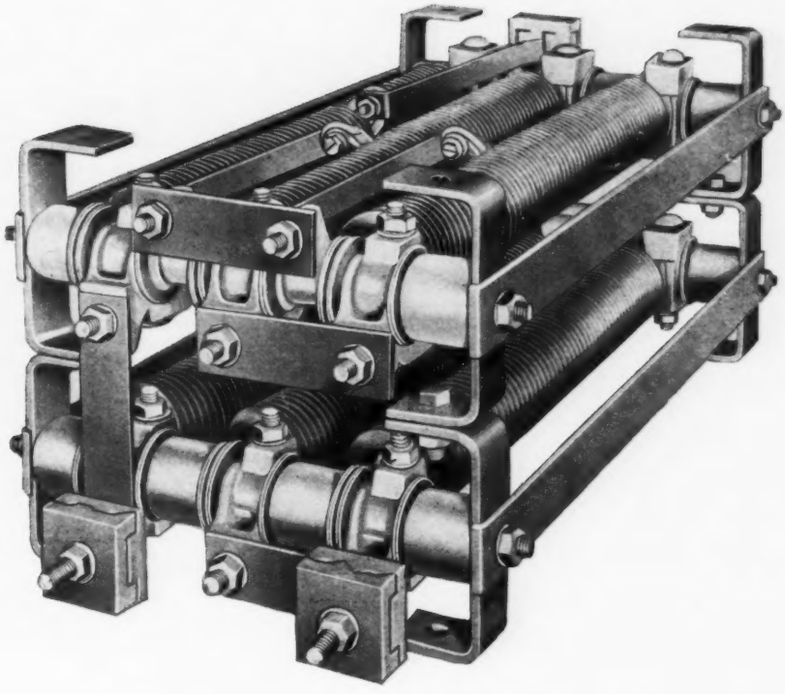
•

Scrubbers Rebuilt for Three-Phase Use

Standard type floor scrubbers such as are used in factories and commercial places are equipped with repulsion or repulsion-induction motors for connection to 110-volt supply from ordinary convenience outlets. But in some factories there are no 110-volt convenience outlets, service arrangements for portable equipments being for three-phase supply at power voltage, usually 440 volts. This was the condition that existed in the Chevrolet plant at Flint, Mich., and for a time the janitor crews connected their scrubbing machines to those lighting sockets most easily reached. Sometimes the scrubber operator had to climb a stepladder to make the connection and sometimes he would leave the socket in worse shape than he found it. As a matter of fact quite a lot of the trouble that developed on the lighting circuits could be traced to the practice of using lamp sockets as convenience outlets.

One thing that could be done to correct the condition would be to install an adequate number of 110-volt outlets. But this would mean a lot of wiring. After some study it was decided it would be cheaper to put three-phase induction motors on the scrubbers than to do the new wiring. A contributing factor in favor of the induction motors was that the higher maintenance cost of the repulsion or repulsion-induction type motors would disappear. The scrubber motors were changed to 110 volts, three phase, squirrel cage. On the hand truck that each janitor crew uses to carry pails, soap and other appurtenances of the art was mounted a three-phase, 440/100-volt transformer with a 50-ft. cable for connection to the nearest 440-volt outlet.

Something NEW *in* RESISTORS



A DECIDED improvement in terminal fittings is found in the new Monitor Mill type resistor. This resistor includes all the essentials of the famous Monitor Edgewound and in addition, has malleable iron terminal clamps which are supported directly from the frame, relieving the resistor elements of all cable strain and vibration. Heavy pressed steel terminals provide intermediate tap connections. The location of these terminals can be easily and quickly changed. All wiring and inter-connections between banks are conveniently made at the end of the frames. These resistors will operate at high temperatures without damage, and by virtue of their improved sturdy construction they are especially suitable for installations in steel mills, cranes, locomotives, and places subject to severe vibration and shocks, involving heavy currents and general rough usage.

Monitor

Monitor builds resistors for every class of service— *Smooth-wound* for low-currents, *Hex-wound* for intermediate currents, *Edgewound* for heavy currents and *Edgewound Mill Type* for applications involving heavy currents, severe service and rough usage.

Special mountings are available for applications where standard mountings are not entirely suitable; quotations on same will be furnished on receipt of full information concerning the requirements. Monitor Sales Engineers in principal cities will gladly consult with you. Write us.

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Monitor Controller Company

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BALTIMORE, MARYLAND

Monitor Edgewound Resistors

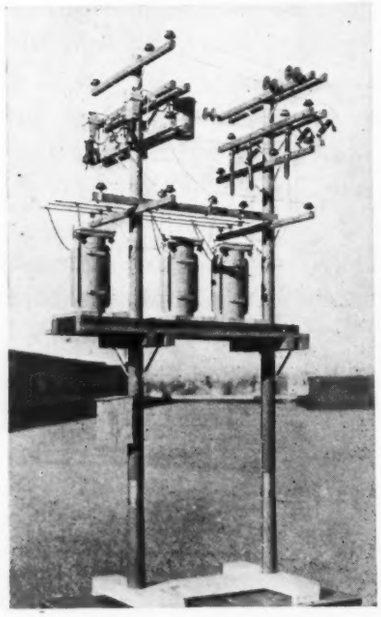
Field OPERATING PRACTICES

New ideas and practices in the operation of well-designed, constructed and maintained plants and systems

Transformer Crib for Use by Small Gang

By R. A. HAMMACK
Overhead Standards Engineer
Public Service Company of Colorado, Denver

In the mountainous mining sections served by the Public Service Company of Colorado it is frequently necessary to make three-phase power installations of such a size that they require a two-pole, crib-type structure. In designing a crib for this type of service it was required to keep foremost in mind that in the outlying districts there is usually only a small crew of men available for installing structures of this kind. On this consideration, as well as on the over-all economy of the installation, the crib shown in the accompanying illustration was developed.



Simplified transformer structure

This is a model of a 13,200/230-volt transformer crib with primary metering. The model is on a scale of two inches to one foot.

To accomplish ease of handling by a small gang, the poles were spaced 9 ft. apart, two of the transformers mounted between them and the third on the extended platform. By this means each individual transformer can be handled by one set of blocks attached directly to the pole.

This is in contrast to the usual design where the three transformers are placed between the poles and where, in order to handle the middle transformer, it is necessary to lash a timber to the poles, to use two sets of blocks, or to tie a rope or chain between the two poles from which to suspend the blocks. These methods require more men to do the same job with the same degree of ease and safety.

Another feature of this crib is that the two 14-ft. timbers which support the transformers are spaced far enough apart to clear a transformer. This permits a transformer to be raised straight up from the truck between the timbers to a height slightly above them. The two planks upon which the transformer rests are then slipped into place and the transformer set down. Lowering the transformer is an equally simple matter. It is not necessary to swing the transformer out over the side of the crib.

Lightning arresters and fuse cut-outs are installed on the crib and clear climbing space has been provided for operating the cutouts from the pole. A small platform has been provided on each side of the crib, but it is not intended that any work shall be done on the primary of cribs of this class while hot.

We have used cribs of this type for several years and have found them so successful that we now use them not only in the mountainous districts but throughout our entire system.

Line Truck Adapted to Tree Trimming

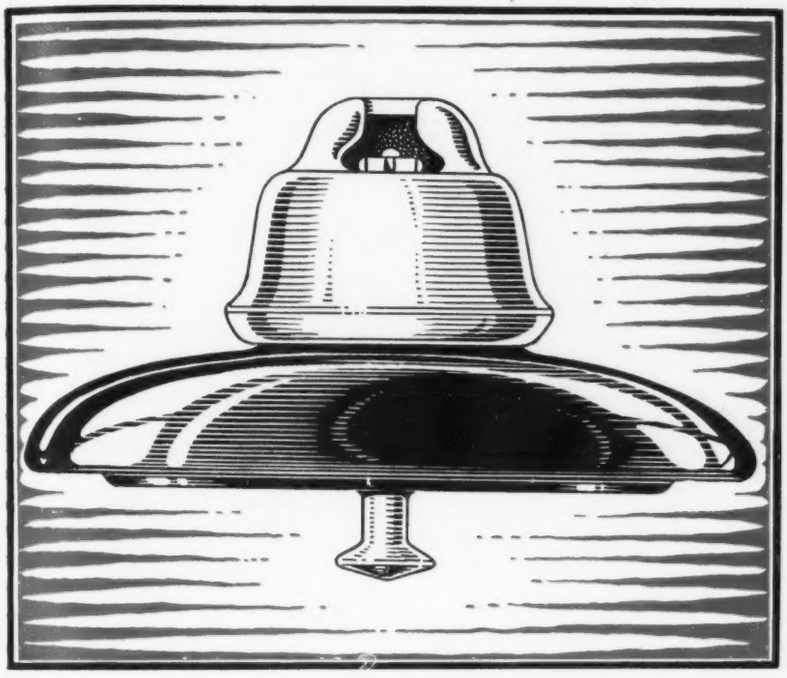
An innovation which saves time, simplifies operations and minimizes the hazards of tree trimming has been developed by distribution engineers of the San Joaquin Light & Power Corp., Fresno, Calif. The device does away with ladders, ropes, timbers and other equipment formerly used in this operation.

A special boom mounting a platform on the outer end is substituted for the regular boom on the line truck, the new extension being held in place by means of eye sockets installed on the vehicle. Rigging permits the plat-

Special boom mounted on a line truck simplifies tree trimming

Truck in place and the platform elevated for use. Special tools permit all cutting to be done from the platform, saving time and reducing the hazards of this operation.

You save all along the line



when you use

LOCKE Suspension Insulators

You save on construction.

The extremely accurate dimensions of the connecting parts reduce construction time and labor costs. Linemen prefer them because they are easier to handle.

You save on maintenance.

These tough, rugged Locke Suspension Insulators will stand up under shocks which will leave more fragile insulators completely shattered. Fewer replacements and reduced maintenance are items for the right side of the operating balance sheet.

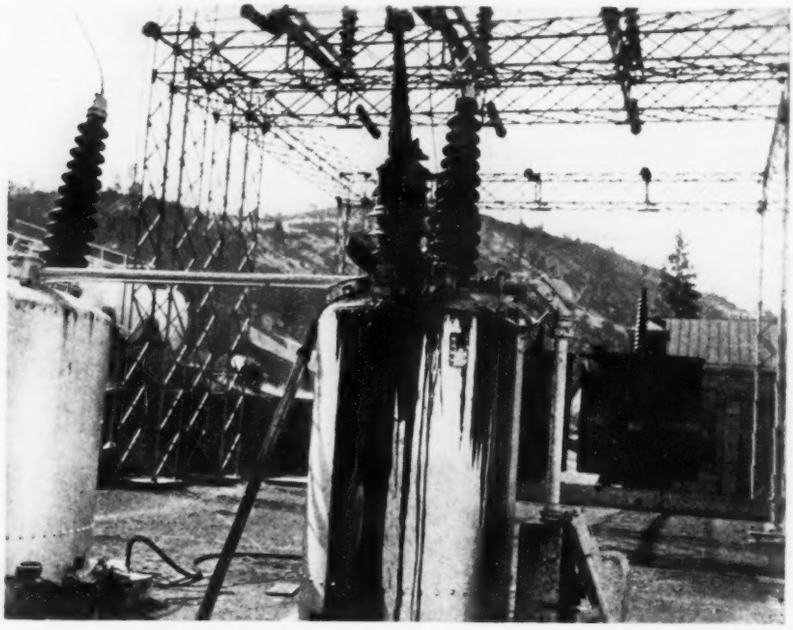
You save on your investment.

The many refinements of design and manufacture have added additional satisfactory life to every Locke Suspension Insulator. Those extra years of service are real dividends.

LOCKE PORCELAIN INSULATORS

LOCKE INSULATOR CORPORATION • BALTIMORE MARYLAND

WHAT HAPPENS ON A 220-KV. FLASHOVER

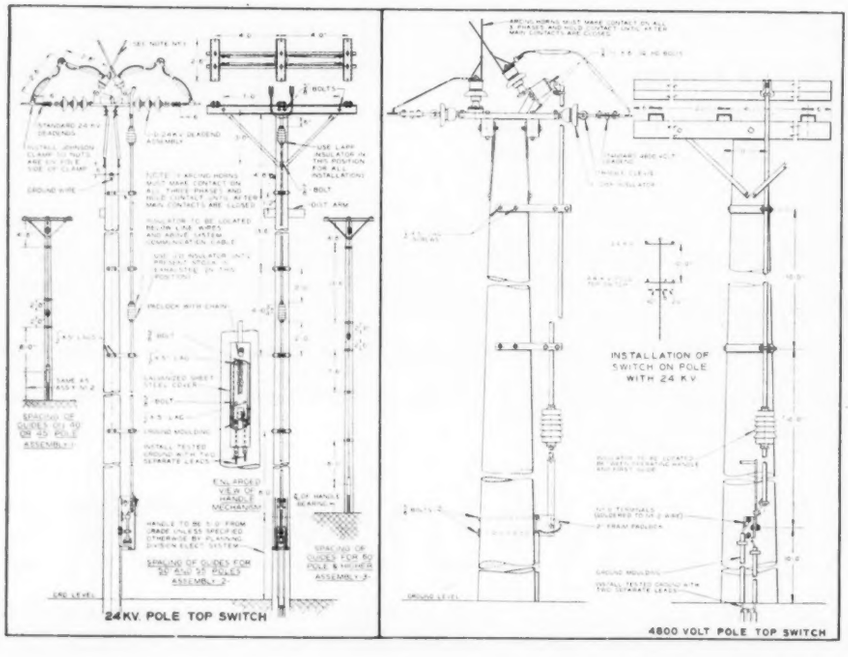


A flashover followed by a power arc destroys a 220-kv. breaker bushing. Porcelain flys 20 to 40 ft., compound melts and takes fire, calling for a ladder and extinguisher. Often petticoats on adjacent bushings are injured. Just one of the many emergency troubles power operators must meet

form to be raised to any position up to a maximum of 28 ft. and to be held in any working position that may have been found convenient for the tree-trimming crew.

In operation, the truck is backed up to the tree to be trimmed. Smaller limbs are trimmed with hand tools. Larger limbs are removed by means of saws or cutters mounted on long handles. All of the work is done from the platform, which eliminates needless climbing and the hazards of using tools in difficult locations in the tree itself.

STANDARD 24-KV. AND 4.8 POLE-TOP SWITCH INSTALLATION USED BY DETROIT EDISON



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Relate Line Outages to Crossarms Used

By B. E. ELLSWORTH
Engineer
Iowa-Nebraska Light & Power Company, Lincoln, Neb.

This company operates 900 miles of 33-kv. transmission line and from the reports of interruptions due to lightning it is very apparent that some lines are more "hard hit" than others. The lines cover parts of three states and the climate over this territory varies considerably.

The crossarms used on the lines are 5, 7, 8 and 10-ft. fir and 36-in. all-steel triangular arms (similar to Bo-arrow and Keystone). Lines constructed on steel poles seem to have just as good an operating record as lines constructed on wooden poles with all-steel arms. Therefore, this brief report concerns crossarm construction only, based on the theory that a wooden crossarm has a high flashover value in comparison to an all-steel arm.

Variables to be considered are the severity of lightning at any particular locality and the type of crossarm used. In order to eliminate the lightning variable, it was assumed that lightning is proportional to the rainfall at any particular locality for any particular year. Then the rainfall for the towns near the lines in question represents the severity of lightning on that line. The outages due to lightning for each transmission line for the years 1932, 1933 and 1934 were corrected for 30-in. rainfall, which is the average for the territory that is served, thus eliminating the lighting variable.

Dividing these corrected line outage figures by the line length in miles and averaging the results for lines with wooden arms and those with steel arms showed that there were averages of 0.720 outages per year per mile for lines constructed with all steel arms and 0.400 outages per year per mile for lines constructed with wooden crossarms. This result would indicate that lines with all-steel arms will probably have 180 per cent of the outages experienced by lines using wooden arms.

The broadside here reproduced shows Hotpoint's way of pulling sales for themselves—and for you—by featuring all their Monel-topped ranges, "Dorian" and "Belmont" included.

Silvery Sheen—and Sparkle!
. . . WITH A MONEL METAL TOP
Now . . . Monel Top Hotpoint Ranges to match sinks, cabinets, dishwashers and other Monel Top Equipment in modern "Ensemble" Kitchens.
THE Dorian
THE Belmont

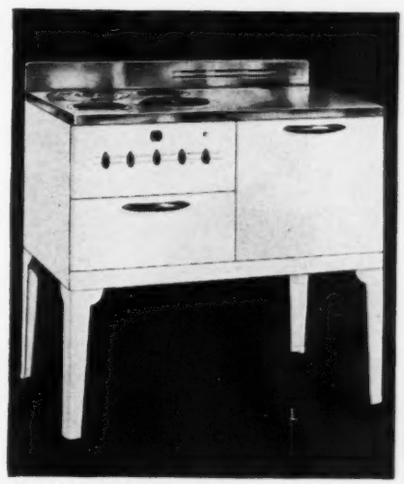
HOTPOINT SMASHES 'HIGH COST' MYTH!

Hotpoint "Dorian" range, with Monel top. Made by Edison General Electric Appliance Co., Chicago, Ill. Like the "Belmont", the "Dorian" is equipped with Calrod heating units of Inconel.

TAKE a tip from Hotpoint! The spread above shows that Hotpoint believes it's good business to get behind a good thing. And Hotpoint knows from experience how good Monel* is.

Hotpoint is putting plenty of selling punch behind "Dorian" and "Belmont" . . . the two ranges AT THE LOWEST PRICE HOTPOINT HAS EVER OFFERED MODELS TOPPED WITH MONEL! Your customers, too, know Monel as the ideal kitchen metal . . . rust proof, crack proof, silvery, and long-lived.

So here's your chance to build profits this fall. With these models Hotpoint banishes the notion that Monel is out of reach. And at these prices, Hotpoint appeals to a much larger market. Play up "Dorian" and "Belmont" strong, and watch your sales climb. For the full price-list, write to-day to



Hotpoint "Belmont" range, with Monel top. These two ranges offer the lowest price yet at which the public could buy Hotpoint models with Monel.

THE INTERNATIONAL NICKEL COMPANY, INC. • 67 Wall Street, New York, N. Y.

MONEL

INCO MONEL TRADE MARK

* Monel is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. This alloy is mined, smelted, refined, rolled, and marketed solely by International Nickel.

SUPERIOR

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*(BAIS-20)

TEST SWITCHES

FOR

TESTING
CALIBRATING
DISCONNECTING

» METERS
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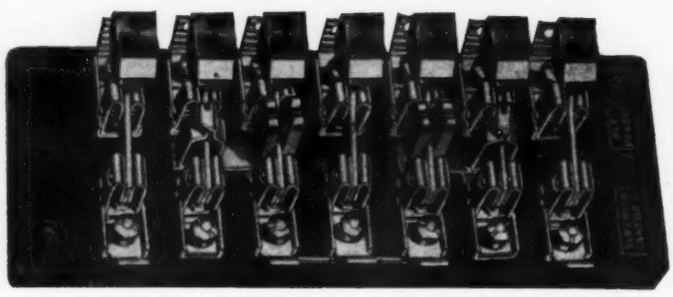
INSTRUMENTS



Cat. No. 1007F Superior Test Switch
For 3 phase, 3 wire meters

Superior Test Switches are rugged and well made. We have them in standard types or special types to meet all requirements. Get paid for ALL energy consumed—use Superior Test Switches.

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*Been at it Since 1920

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Looking for an electrical product? If you are, you can learn who makes it quickly in the Buyers Reference Number of Electrical World. Or if you know only the manufacturer's name or the trade name, the Trade Name and Company Index in this same volume will answer your needs in a jiffy.

In addition, you will find the Product Exhibit Section most helpful in locating branch offices, warehouses, etc.

This handy guide to everything electrical should prove quite helpful in planning your 1936 purchases.

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330 West 42nd St., New York, N.Y.
Headquarters for Everything Electrical

Building Up THE LOAD

New ideas and practices in selling electrical equipment and service to industrial, commercial and domestic customers

Engine Can't Compete With Bought Power

By W. J. KYLE
Byllesby Engineering & Management Corporation, Chicago, Ill.*

Power salesmen should remind the customer of his automobile engine when confronted with internal combustion engine competition. Every industrial customer is familiar with automobiles and knows the engine requires very little maintenance during the first two years. At the end of a two-year period the automobile engine has to have considerable maintenance, and this increases with age and mileage. Lubrication cost increases unless the engine is maintained in good condition and frequently this cannot be corrected without cylinder reboring and installation of oversized pistons. These facts are of particular pertinence when the customer is toying with the idea of using a converted automobile or truck engine.

This most troublesome competition often makes use of a traction engine equipped with a natural gas carburetor. It has been our experience that such installations do not survive very long. Frequently these installations are of second-hand engines, and even with considerable attention they do not prove very satisfactory after short trials, but the installation is so cheap it is an inducement to try one out.

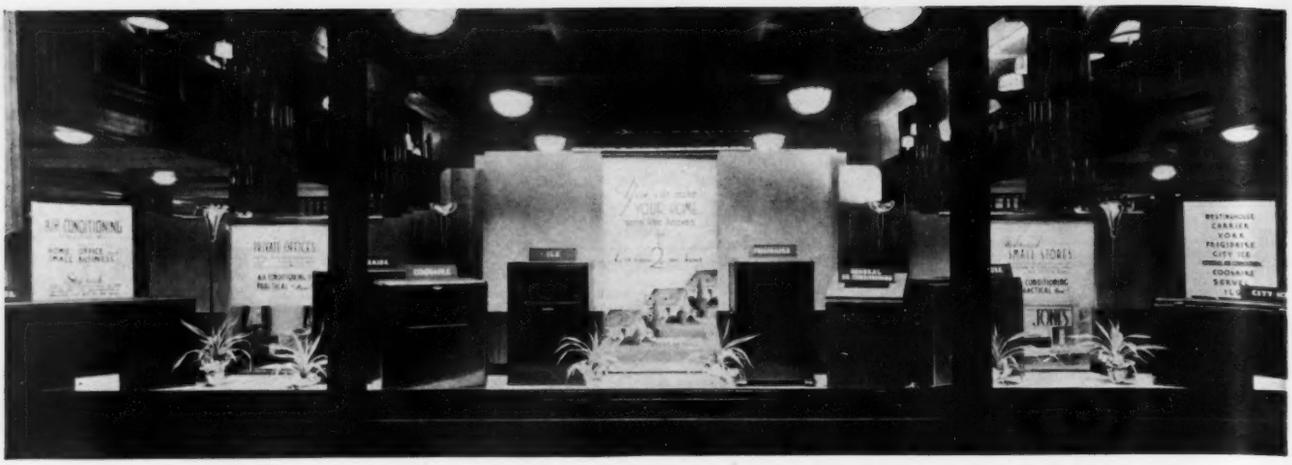
The following information from J. M. Cooper, Gulf Oil Corporation, Houston, Tex., who discussed the converted automobile or truck engine for oil well pumping, at a recent A.S.M.E. meeting, is of interest in regard to this form of competition:

> The auxiliary equipment, standard on these engines, was not suited to stationary service and continuous duty. Radiators and fans were too small for efficient cooling; clutches failed under constant punishment of the pumping cycle; drive shaft bearings were not designed to carry the thrust and radial loads imposed by belt drives; gasoline carburetors were not readily adapted to the use of natural gas, and valves, designed for automobile engine fuel, gave considerable trouble because of sticking and

*From paper to Rocky Mountain Electrical Association.

In Which Would You Rather Work?

Poorly distributed and inadequate light varying from 2 to 8 ft.-candles intensity was supplied in the plant of the Aetna Ball Bearing Company, Chicago, by mercury-vapor lamps located 10 to 16 ft. apart. Most of the light fell in the aisles and in other non-productive areas rather than on the machines. The darkness overhead and the poor quality of the light gave a depressing appearance to the shop. Lighting engineers of the Commonwealth Edison Company were called in and they recommended 300- and 500-watt lamps in Glassteel diffusers on 12-ft. centers. There are now 12 ft.-candles of evenly distributed, well-diffused light. Shadows and glare are minimized. The bright, cheery room with its greatly improved seeing conditions makes for more rapid, more accurate work by the workers.



Attractive display of unit conditioners contributes to sale of 162 units in Cincinnati

warping when natural gas was used as a fuel.

In addition to the auxiliaries which were substituted for standard equipment, a governor had to be added. These auxiliaries do not get into mass production and, consequently, sometimes cost more than the engine itself.

Two engines running 1,200 r.p.m. cost nearly four times as much to operate as two engines running 900 r.p.m. An increase of 33 per cent in rotating speed produces an increase of 300 per cent in operating cost at the same developed horsepower. Most of these engines are governed at 800 to 1,000 r.p.m., as compared to their peak horsepower developed on the road at between 3,000 and 4,000 r.p.m.

Assuming that an 82-hp. automobile engine is to be run at 900 r.p.m. for most economical pumping service, we find that the peak horsepower at this speed is approximately 22. Allowing for fan, water pump and natural gas fuel, this horsepower is reduced to 16.8 at the pump rod. Then allowing 33 per cent for peak load, we find that our 82-hp. engines are capable of giving economical service on oil-well loads up to 11.2 hp.

•

Package Unit Sales Follow Heat Waves

By F. J. DEYE
Power Sales Engineer
Cincinnati Gas & Electric Company

Cincinnati experienced a record summer as far as high temperature and humidity are concerned. It is interesting to follow the sale of air-conditioning equipment in relation to the heat waves, especially the small self-contained or "package units."

Arrangements were made with nine dealers, all members of the air-conditioning division of the Cincinnati Electrical Association, to display unit type equipment. The units were set up in the large show window of the Cincinnati Gas & Electric Appliance Company on June 24, 1936, and remained until July 17, 1936. This display was originally planned for one week, but due to extreme temperatures and the interest shown, it was continued until practically all units displayed were needed by the dealers to fill orders.

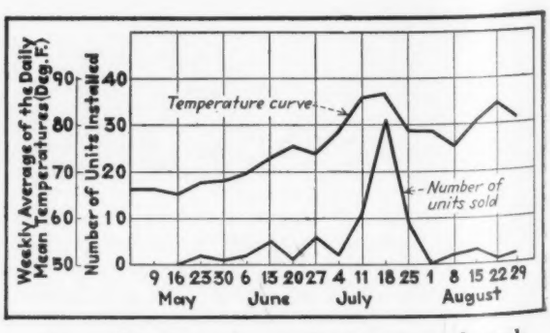
A member of the power sales division of the Cincinnati Gas & Electric Company was on duty at all times during the display to explain the different units and give general information regarding initial cost, capacity, operating data, etc. Prospects were given a circular on each unit and an attempt was made to obtain the names and addresses. When these were secured the prospects were divided equally among the various dealers. In quite a few cases sales were made as a result of the customer going directly to the dealer of the specific unit in which he was interested, after visiting the display.

Units were purchased by various officials of organizations for use in their private offices or bedrooms. The results were so satisfactory that several large central type installations were made. In one case a decision to condition an office building was traced to the use of a "package unit" in the executive's office. In another instance a unit was put in on trial in the bedroom of a prospect. After using it two nights he purchased it, together with seven additional units—one for his office, one for another bedroom in his home and five for the bedrooms of his children. Further sales to his friends resulted from his recommendations.

The accompanying table of installations tells the story. Although the total horsepower installed is lower than that of previous years, the number of installations has increased considerably. This definitely indicates a wider acceptance of air conditioning. It is possible and probable that air conditioning units will take their place in the home, along with the electric refrigerator and other appliances in great demand.

Air-Conditioning Installations, Cincinnati, O.

Classification	Prior to 1935		1935		1936 First 8 Mos.	
	No.	Hp.	No.	Hp.	No.	Hp.
Residential	39	62.25	32	47.50	65	96.75
Offices	43	181.00	35	749.25	39	256.50
Small stores	15	266.50	9	82.00	20	179.75
Large stores	4	1,045.00	4	879.00	2	82.00
Restaurants	17	309.50	8	406.00	20	281.25
Theatres	12	1,815.00	4	303.00	8	290.00
Miscellaneous	19	1,802 00	4	38.25	8	58.50
Totals	149	5,481.25	96	2,505.00	162	1,244.75



Air-conditioning sales at Cincinnati reach peak during weeks of maximum summer temperature

Toward a new and better way of living

Soon Kelvinator will make an announcement—

An announcement of vital interest to you.

For it will affect millions of people. People in large cities—in small towns—in rural communities.

It will cause them to stop, to think about the way they live—and the way they might live.

It will start conversation and discussion. It will be the beginning of change, the discarding of old standards, the adoption of new ones.

And it will create an opportunity for salesmen, for specialty dealers, for department stores, for utility companies—such as we have never known before.

The facts about Kelvinator plans for 1937 are known only to a few men.

Don't depend on rumors.

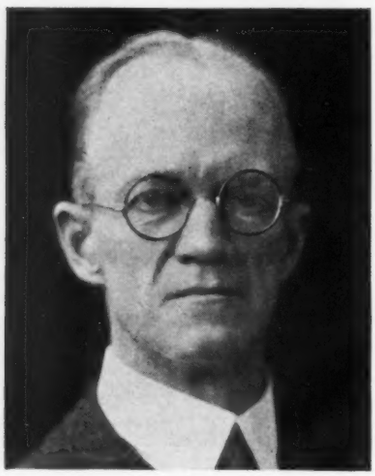
KELVINATOR CORPORATION

Detroit • Michigan

News ABOUT PEOPLE

Samuel Wylie Miller Medal Awarded to H. M. Hobart

As "pioneer and leader in a welding research movement which in nineteen years has spread to the far corners of the world and vitally affected industry," Henry M. Hobart,



consulting engineer of the General Electric Company, was awarded the Samuel Wylie Miller Memorial Medal by the American Welding Society at the recent annual meeting in Cleveland.

Mr. Hobart developed mercury-arc rectifiers and is an authority on arc welding, design of dynamo-electric machinery, insulation and standardization. He is active in promoting international and national electrical standardization and is a member of the U. S. National Committee of the International Electrotechnical Commission.

Mr. Hobart was born in Boston and was graduated from the Massachusetts Institute of Technology in 1889. For the next five years he was connected with the Thomson-Houston Company and afterward with the British Thomson-Houston Company. He resigned from that company in 1899 to become associated as consulting engineer with the Allgemeine Elektricitäts-Gesellschaft, Berlin. Three years later he established an independent consulting practice in London, which he continued for eight years. In 1911 he became a consulting engineer with the General Electric Company, the position he now holds.

A founder and director of the American Welding Society, Mr. Hobart is also a past-vice-president of the American Institute of Electrical Engineers and a fellow of the American Association for the Advancement of Science. He is a member also of the Institution of Electrical Engineers, Great Britain.

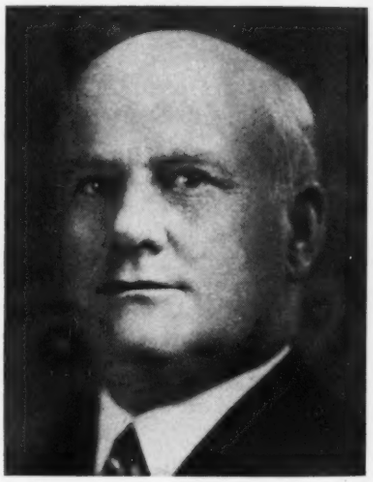
•

▶H. B. DWIGHT, electrical engineer for the Colorado Public Utilities Commission, has retired because of ill health. Mr. Dwight was professor of electrical engineering at the University of Colorado before joining the commission in 1919.

John W. White, new general manager of Westinghouse International, with headquarters in New York. He formerly was associated with International in Buenos Aires

J. B. Groce Joins Staff of Bethlehem Shipbuilding

Joseph B. Groce, for the past twelve years head of the public relations bureau of the Edison Electric Illuminating Company of Boston and director of the radio broadcasting sta-



tion "WEEI" during the period of its operation by that utility, has joined the organization of the Bethlehem Shipbuilding Corporation, Quincy, Mass., to engage in publicity and public relations work. Mr. Groce was connected with the latter company before entering utility service. He was director of the New England Bureau of Public Service Information, with headquarters at Boston, for about seven years prior to joining the Edison company, and is known throughout the power industry for his constructive work in this important field.

•

▶ROBERT S. BOLAND, for the past ten years chief engineer of the lamp engineering department of the Hygrade-Sylvania Corporation, Salem, Mass., has resigned to enter new fields of activity. Mr. Boland had been with

Burroughs

PLAN YOUR PAYROLL ACCOUNTING NOW

to obtain the information required by the

SOCIAL SECURITY ACT

Many employers are finding in recent Burroughs developments a simple solution of the accounting problems set up by the Federal Social Security Act. Often the exceptional speed, ease and economy of new Burroughs machines make it possible for employers actually to lower accounting costs and still have the additional information required.

In fact, many say: "We are glad the Social Security Act prompted us to investigate, because we now have the complete payroll accounting system we have needed for a long time."

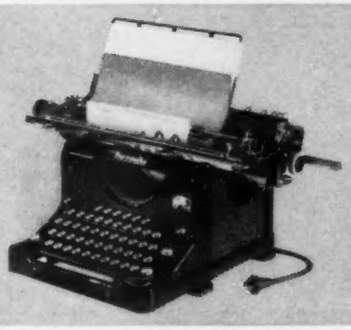
Investigate. Let a Burroughs representative assist you in meeting your payroll problems now, so you will be prepared to furnish the information required by the Act when it becomes effective the first of the year.

BURROUGHS TYPEWRITER ACCOUNTING MACHINE

Writes check (or pay envelope), earnings record, employee's statement and payroll summary in one operation. Column selection automatically controlled. All totals accumulated. This machine is only one of several models; payroll work is only one of the many jobs they do.

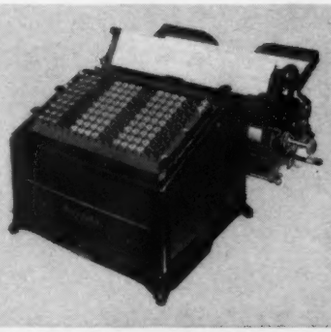
BURROUGHS DESK BOOKKEEPING MACHINE

Posts earnings records, automatically prints dates in proper columns, automatically subtracts deductions—calculates net pay. Can also be used as a fast, practical adding-subtracting machine for all kinds of accounting work. Many styles and many models—all low in price.



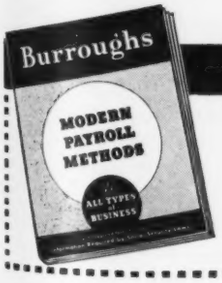
BURROUGHS CHECK-WRITING TYPEWRITER

Writes payroll checks in units or in strips. Payroll summary completed in same operation. Fast and easy insertion and removal of checks. Can also be used as a typewriter for correspondence and general typing. Electric carriage operation. Several models.



BURROUGHS AUTOMATIC PAYROLL MACHINE

Writes check (or pay envelope), employee's earnings statement, earnings record and payroll summary in one operation. Accumulates all necessary totals. Many models for payroll work, as well as for scores of other accounting jobs.



SEND FOR THIS NEW PAYROLL FOLDER!

BURROUGHS ADDING MACHINE COMPANY, 6931 SECOND BLVD., DETROIT, MICH.

Send me the new folder "Modern Payroll Methods," illustrating complete payroll accounting methods, with typical entries and suitable column headings for maintaining the information required by the Social Security Act.

Name_____ Address_____

the company about twelve years and was in charge of departmental service in both of its lamp-making factories. At this writing his successor has not been appointed.

•

F. C. Culley Made President of Indiana Association

Although F. C. Culley, vice-president of the Southern Indiana Gas & Electric Company, Evansville, Ind.,

and new president of the Indiana Electric Association, is a comparative newcomer to public utility circles of the state, he has been identified with the business for nearly 30 years. After spending a year as a school teacher following graduation from The Citadel, Charleston, S. C., Mr. Culley in 1907 began his public utility career in the Augusta, Ga., utility's railway division; in 1908 became auditor; in 1911 assistant secretary, and in 1933 vice-president and general manager. With the absorption of his company by the Georgia Power Company he became division manager. In 1934 he went to the Southern Indiana Gas & Electric Company, in the capacity of vice-president, taking with him an outstanding record of achievement in public service and civic affairs.

•

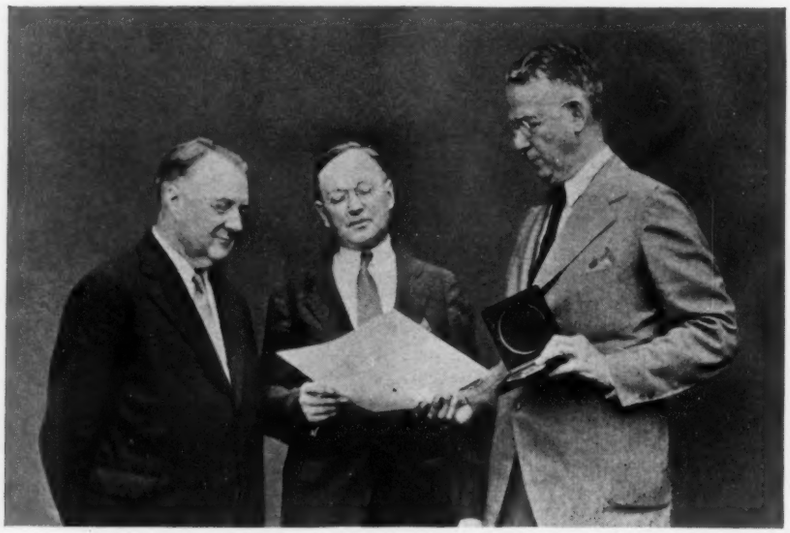
▶W. H. CAHOON, formerly electrical engineer for George F. Hardy, consulting engineer, New York, has recently been appointed electrical engineer with the T.V.A. with headquarters in Knoxville.

•

Westinghouse Elevator Honors E. M. Bouton

At the factory of the Westinghouse Electric Elevator Company in Chicago all employees recently assembled to witness honors conferred upon E. M. Bouton, chief engineer of the company.

A. W. Robertson, chairman, presented Mr. Bouton with the silver circle "W" and the Westinghouse Order of Merit, containing the inscription: "For excellence in the field of electric elevator engineering; for engineering leadership which has brought not only standing to Westinghouse electric elevator practice, but recognition of leadership in a rapidly expanding art; for significant engineering contributions to some of the most noteworthy elevator equipments in the country."



Frank C. Reed, president of the Elevator Company (left), introduced Chairman A. W. Robertson (right), who presented Mr. Bouton with the silver circle "W" and the Westinghouse Order of Merit

G. W. Mason New President of Nash-Kelvinator

George W. Mason, who was made president of the Nash-Kelvinator Corporation, has risen to his present position by way of successful execu-

tive activities in the refrigeration, automotive and financial fields.

Recognizing the great possibilities of electric refrigeration, Mr. Mason accepted the presidency of Copeland Products Company, Inc., in 1926 after spending thirteen years in the automotive field, with Studebaker Corporation, Dodge Brothers and Chrysler Corporation. In 1928 he assumed the presidency and chairmanship of the board of Kelvinator Corporation. In this capacity he has established an enviable reputation, bringing Kelvinator through the depression into a strong financial and business condition.

•

▶ ERICH A. MEES has been appointed acting chief engineer of the Federal Power Commission pending the recovery of Roger B. McWhorter, who was seriously injured in an automobile accident and is now convalescing. Mr. Mees has been assistant to Thomas R. Tate, director of the National Power Survey.

▶ J. BRODIE SMITH, vice-president and general manager of the Public Service Company of New Hampshire, was the guest of honor at a gathering in Manchester on October 26 in recognition of his half century of service in the electrical industry. A parchment souvenir signed by 800 company employees was presented to him by A. R. Schiller, vice-president in charge of operations, and Mr. Smith was also

• NO BOW IN THIS "BABY" •

straight as a string— rigid as a rock!

STRAIGHT as a string this all-steel CRESCENT Hack Saw cuts down thru that angle iron. No bow to the blade. No buckling of the frame because it's built ruggedly and balanced *right*. All CRESCENT frames are designed with strength where strains center and sufficient weight to provide a "man-size" tool. Every one has that "hang" and "feel" that appeals to men who know tools.

Eight different frame styles comprise the Crescent line—a type for every need. Ask your supplier or write for the new Crescent catalog.

CRESCENT TOOL CO., Jamestown, N. Y.

CRESCENT and Smith & Hemenway TOOLS

the recipient of a 50-year service medal conferred by Walter S. Wyman, president of the New England Public Service Company. Tributes were voiced to Mr. Smith's achievements as a pioneer utility operator, his progressiveness, enterprise and good citizenship. Messages of congratulation were received from Owen D. Young, chairman of the General Electric board, and C. W. Kellogg, president of the Edison Electric Institute.

•

"Pick" Warren to Assume New Executive Duties

Pickett L. Warren (many people have wondered what "Pick" stood for) has resigned as Chicago district sales manager of Ohio Brass Company to become affiliated with the Royal Electric Manufacturing Company, Chicago, Ill. Beginning January 1, 1937, he will be an officer and director of this 23-year old manufac-

turing concern in full charge of sales of high- and low-voltage switches and miscellaneous specialties. Thirteen years ago he went to work for the Ohio Brass Company and since 1925 has been in Chicago. When interviewed as to why he joined the Royal organization, Mr. Warren said that while the opportunity to serve the utility industry in a broader way may have something to do with it, he suspected it was because he thought he could have more fun and make more money.

•

▶RALPH WILKERSON, formerly with the Interstate Power Company in Cushing, Okla., has been transferred to Lancaster, Wis., as manager for Interstate Power in that city.

OBITUARY

Alexander D. Robb

Alexander D. Robb, president of the Niagara Electric Service Corporation and vice-president and general manager of the Buffalo, Niagara & Eastern Power Corporation, died October 27 in Niagara Falls, N. Y., following an operation. He was 58 years old.

Mr. Robb had been connected with the utility industry in the United States and Canada for approximately 35 years. Starting with the Canadian Niagara Power Company in 1902, he remained with that company in various capacities until 1917, when he became superintendent of the Niagara Falls Power Company. Four years later he became assistant to the president, subsequently was made vice-president and in 1933 was elected vice-president and general manager of the Buffalo, Niagara & Eastern Power Corporation. He was also an officer and director of several Canadian utilities. Mr. Robb served as president of the Canadian Electrical Association for the 1933-34 term.

•

H. Durant Cheever

H. Durant Cheever, chairman of the board of the Okonite Company, New York, died in Paris, France, October 23, in his seventy-first year. Mr. Cheever's death brings to a close an association with Okonite of almost a half century. He started in 1888, following graduation from Harvard University. The Okonite Company, maker of insulated wire and cable, was founded by his father, the late John H. Cheever. Mr. Cheever became chairman of the board in 1932 after having occupied the presidency for a number of years. A former resident of Greenwich, Conn., he had been living in Paris since 1931.

•

▶JOHN A. WAHLGREN, vice-president Habirshaw Cable & Wire Corporation, died suddenly, of a heart attack on October 11. For many years Mr. Wahlgren was with the insulated wire division of the U. S. Rubber Products Corporation. He resigned as sales manager a few years ago to join the Habirshaw Corporation. Mr. Wahlgren was active in the affairs of the National Electrical Manufacturers Association, having been chairman of the preliminary planning committee, adequate wiring program; chairman of the rubber power cable section of the wire and cable division, and of the service entrance cable group of the rubber power cable section.

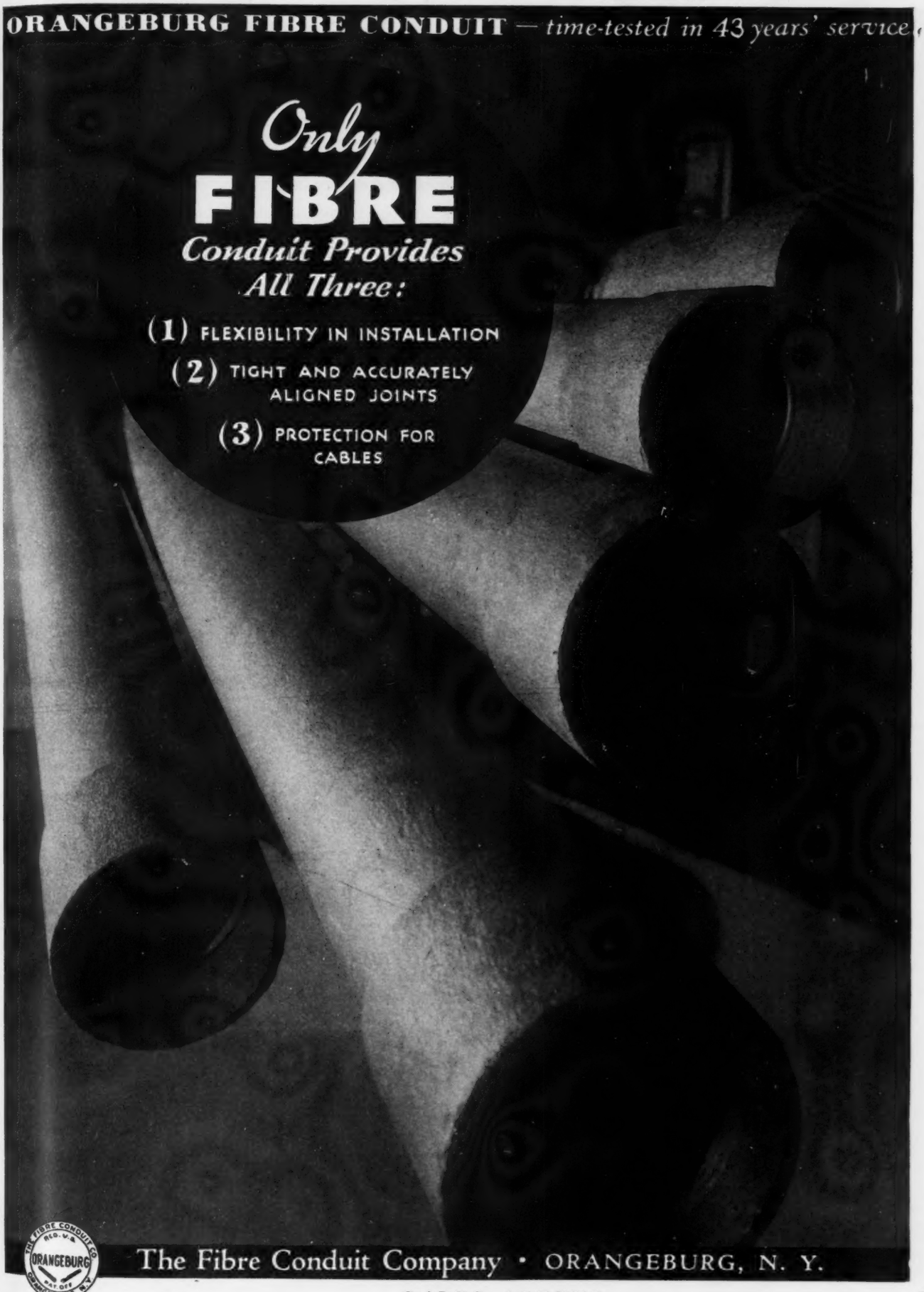
▶JOHN A. GARVER, senior member of the law firm of Shearman & Sterling, New York, and general counsel for the Consolidated Gas Company, died October 23, of a heart attack, at his summer home at Oyster Bay, L. I., in his eighty-third year.

▶NICHOLAS S. HILL, JR., president of the Hackensack Water Company, died October 18. Mr. Hill was an authority on utility valuation and rate making. He was a past-president of the American Water Works Association and had been an honorary member since last summer. At the time of his election to honorary membership he was cited as "an engineer of unusual technical ability combined with business capacity." He was also a member of the A.I.E.E.

▶WILLIAM H. MCGRATH, prominently identified with the beginnings of the electric lighting industry in the Southwest in the late '80s and early '90s, died at his home in Dallas October 5. Mr. McGrath headed the light companies at New Orleans and Houston before going to Dallas in 1893 as general manager of the Dallas Power & Light Company. His interest during recent years centered in the development of irrigation projects in the Rio Grande Valley.

▶HENRY C. ATTWILL, for nearly seventeen years chairman of the Massachusetts Department of Public Utilities and a nationally known figure in regulation circles, died suddenly, of a heart attack, at his home in Lynn on November 1. Mr. Attwill was born in Lynn 64 years ago, was educated at Boston University and practiced law for some years. He served in the Massachusetts House and Senate, was District Attorney of Essex County and later Attorney-General of the state. He served as a member of the former Massachusetts Public Service Commission and became chairman of the Massachusetts Department upon its organization. He returned to the position of associate commissioner last spring upon the appointment of John J. Murray as chairman by the Governor of the Bay State. Mr. Attwill was noted as an analyst of regulation in all its phases and had publicly discussed this theme on many occasions with profound scholarship and understanding of utility administrative problems.

ORANGEBURG FIBRE CONDUIT — *time-tested in 43 years' service*



The Fibre Conduit Company • ORANGEBURG, N. Y.

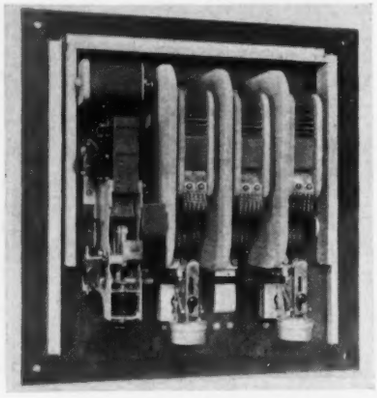
SALES AGENTS

GENERAL ELECTRIC SUPPLY CORP. **GRAYBAR ELECTRIC COMPANY**

New EQUIPMENT AVAILABLE

Air Circuit Breaker

New type air circuit breakers are adapted to industrial and station auxiliary service, or for any heavy duty where many opening and closing operations are required. The standard arrangement is an inclosed breaker



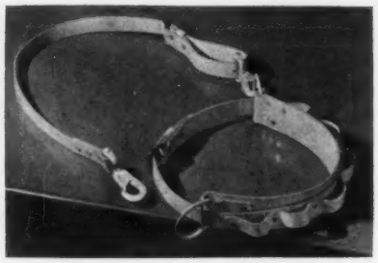
Type AE-1 circuit breaker; 600 volts, 600 amp., three-phase, two-coil; double- and triple-pole models available; for operation on circuits of 250 volts d.c., 600 volts a.c., at 15 to 600 amp.; main contacts silver-to-silver, arcing contacts of special alloy; dimensions, with pull box, 19 x 21 x 21 in.; without pull box, 9 in. deep. **General Electric Co.,** Schenectady, N. Y.

with pull box for mounting on a wall or behind a switchboard panel; without pull box, for mounting on the front of the switchbord. A selective overload feature is said to differentiate between overload and short circuits, time delay being provided up to six to ten times calibration setting and instantaneous above that. Mechanism is electrically operated, trip-free, and latched-in with a solenoid suitable for a.c. or d.c., depending on the rating.

•

Lineman's Belt

Gum-impregnated, laminated, moisture-proof fabric, for which is claimed a tensile strength of 6,500 lb. per sq. in., is used in this safety belt. The "D" rings are not attached to separate straps riveted to the belt; instead, the body belt is looped through them. The material is further said to have high resistance to snagging, cutting and abrasion, as well as high dielectric strength.

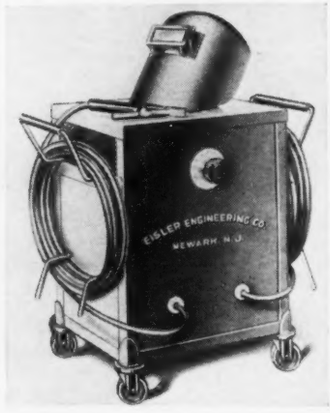


"Hy-Tensil" lineman's belt; Type 24-HT-36. **American Allsafe Co.,** Buffalo, N. Y.

•

A.C. Arc Welder

Built-in air ducts assure natural ventilation for the transformers in this portable a.c. arc welder, one of a recently announced line. The welders have been designed to eliminate critical arc maintenance and they will make welds having a tensile strength of 75,000 lb. per sq. in., it is claimed. Temperature rise is said to be 31 deg. C., and the time of recovery from short circuit to within 5 per cent of normal does not exceed more than 2 cycles of 60-cycle, single-phase current. Makers estimate the cost of operation of a 200-amp. stock welder at 9 cents an hour with a 3/16-in. electrode, at a rate of 3 cents per kw.-hr.

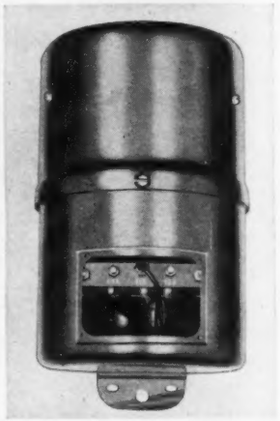


A.c. portable arc welder, single-control model; available also in dual control models; in three sizes, 40-200 amp., 50-300 amp., 75-400 amp., taking electrodes measuring 1/16 to 3/16 in., 3/32 to ¼ in., ⅛ to ⅜ in., respectively; power consumption when not welding, 70 watts for 200-amp. size, 100 watts for 300-amp. size. **Eisler Engineering Co.,** Newark, N. J.

•

Mercury Lamp Transformer

Transformers and reactors designed especially for the requirements of high-intensity mercury lighting have been recently announced. Because of the difference between initial starting voltage required for the lamp and the final operating voltage, a transformer with high internal reactance or a reactor must be used with each lamp. This equipment is designed to regulate the current during starting period and to limit the current for slight changes in line voltage during normal operation. The use of such a transformer or reactor to provide the necessary high starting voltage and somewhat lower operating voltage results in a reduced power factor unless corrected. Therefore, transformer-capacitor units or reactor-capacitor units are available to provide a power factor of 90 to 95 per cent.

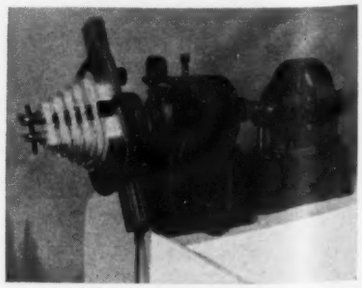


Transformer, transformer-capacitor or reactor-capacitor units available in suspension or wall mounting types; transformer capacitor shown. **Westinghouse Electric & Manufacturing Co.,** East Pittsburgh, Pa.

•

Coil-Winding Head

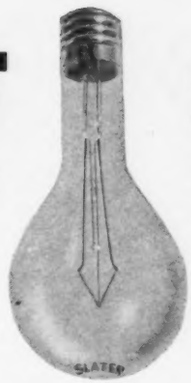
This coil-winding head winds single-phase motor coils in groups up to six in a nest, in all shapes and sizes, and in series so that they can be removed together and inserted in the stator without series soldering. After winding, the head can be collapsed for easy removal of the coils. It is claimed that the unit, which is adjustable for width and length, can be set up for winding in from five to ten minutes. Head has a base with a scale on the side and a flange for mounting the winder head.



Head mounted on coil winder drive. **Ideal Commutator Dresser Co.,** Sycamore, Ill.

SLATER

STREET SERIES



Slater Street Series Lamps now in many thousands of miles of service are proving more economical and less troublesome. They last longer . . . They maintain their brightness LONGER*.

SLATER LIGHTED STREETS

SLATER ELECTRIC & MFG. CO., INC.

297 Adams Street, Brooklyn, N. Y.

Whether It Be For SKYSCRAPER . . . PLANT . . . OR HIGHWAY — try the new SLATER LAMPS for better performance . . . you save too.
WRITE NOW TO ADDRESS ABOVE FOR FULL DETAILS OF LINE.

**Slater Lamps maintain their brightness longer as proven by actual test.*

Wire Measuring Meter

New measuring equipment is designed for measuring wire or rope as it passes through production or as it is fed out for delivery from stockroom or warehouse. The rope is passed through guides, front and rear, and rides a grooved measuring wheel which connects to the counting unit mounted on the side of the housing. Measuring wheel is

Type L-20; counter mounted for side or top reading; rotation can be in either direction; brake prevents overtravel. **Durant Manufacturing Co.,** Milwaukee, Wis.

serrated on its wearing face so it will not slip on the rope. A steel pressure wheel at the top of the unit assists in guiding the rope and holding it down. Length can be counted out at speeds up to one mile per minute, it is claimed.

•

Fused Cutout

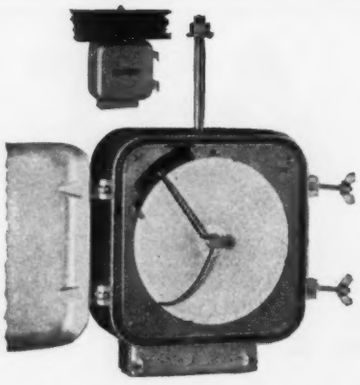
"Q-Q HoTaP." Ratings, 50 amp. or less; rupturing capacity, 1,200 amp.; voltage, 8,000/13,800; should not be used where circuit voltage that cutout interrupts exceeds 8,000 volts; for copper and aluminum conductors. **W. N. Matthews Corp.,** St. Louis, Mo.

Tap-off clamp of this cutout for protecting rural transformers, is permanently attached to the primary conductor with a tapstick. At its lower end it is equipped with a socket to hold the ball attached to the upper end of the fuse cartridge. Cutout is provided with a keyhole eye for easy removal or replacement with a standard ballpoint switchstick. The tail of a flexible universal fuse link is attached to the "Pullink" at the lower end of the cutout. This "Pullink" removes the unburned portion of the fuse link on melt-outs and drops it to the ground, giving an easily visible indication of outages. The device without the fuse tube is available for connecting and disconnecting the transformers and lightning arresters.

•

Ampere Demand Meter

New graphic type ampere demand meters, for checking demand on distribution transformers, are said to have three advantages. They provide a record of the demand, instead of indicating instantaneous values; they may be mounted quickly and they require no leveling. Similar to an ordinary indicating ammeter, they differ chiefly in that they are time lagged so that 30 minutes is required to reach full indication. To install, the stud, extending from the top of the weatherproof aluminum case, is inserted through a spare insulator pinhole in the pole crossarm. Tightening the nut against the top of the crossarm completes the installation.

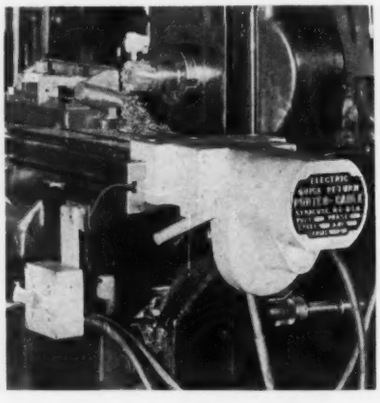


Type CCA; for pole mounting; furnished self-contained or for use with split-core transformer. **Lincoln Meter Co.,** Springfield, Ill.

•

Milling Machine Return

This electric quick return has been designed for use on production milling machines built particularly in the years 1912 to 1921 and on milling machines built since that time without a quick-return feature. It cannot be used on the rack type of milling machine. The drive is through gears to the safety clutch on the feed screw of the machine. If the machine jams for any reason, it is claimed that the clutch will slip and prevent damage to the milling machine or the motor. With the return installed, the table may still be manually operated by crank at the opposite end.

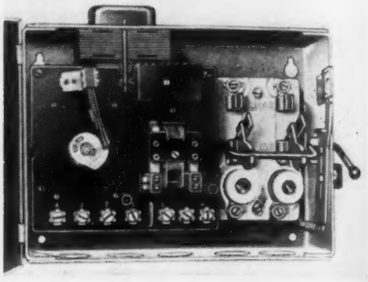


Motor—220-volt, 60-cycle, three-phase reversible type—operates at 1,800 r.p.m. through gear reduction of 2½:1, giving approximate table travel of 30 ft. per minute; lever switches provide remote control; brake on device for emergency stop. **Porter-Cable Machine Co.,** Syracuse, N. Y.

•

Stoker Combustion Controls

Features available on these controls include a patented, trip-free bimetal overload protective unit and built-in knife switch and fuse receptacle, as well as the standard synchronous electric timer for maintaining proper combustion, the pilot relay and the transformer for supplying low voltage current to the thermostat circuit. Overload unit is equipped with a trip-free reset button, which is said to make it impossible to block the contacts closed, thus running the stoker motor without overload protection.



Rated not to exceed ⅓ hp., 110 volts, 50 or 60 cycle; available for ½ hp., 220-volt service and for odd-cycle service in either 110 or 220 volts; thermostat circuit, 25 volts. **Penn Electric Switch Co.,** Des Moines, Iowa.

ENGINEERING DATA FROM MANUFACTURERS

Bulletins and catalogs now available to engineers by manufacturers and associations

HAND GRINDERS—The Dumore Company, Racine, Wis., has issued a hand grinder catalog that illustrates this line, pictures applications of the grinders and furnishes specifications of them. In addition, dimensions are given for mounted wheels and points that may be used with these hand grinders, and the newly added line of arbors and bands is described.

INSULATING OIL PURIFIERS—Bulletin No. 503, issued by Goulds Pumps, Inc., describes its line of Hydroil centrifugal purifiers, for the purification of insulating oil used in transformers, circuit breakers, and the like. The necessity for as well as the methods used in such purification is pointed out, and the mechanical features of their purifiers described and pictured. Dimensions and specifications of the devices are included in the 4-page folder.

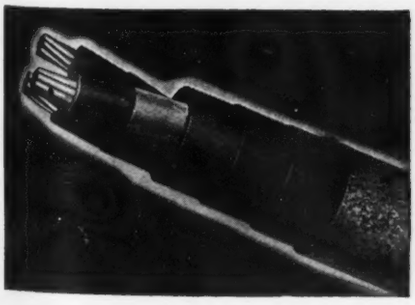
MERCURY VAPOR LAMP—Technical data and operating characteristics of an 85-watt high-intensity mercury-vapor lamp are contained in Sales Engineering Notes No. 130, issued by the Westinghouse Lamp Company, Bloomfield, N.J.

COPPER TUBING FOR BUSES—"Chase Copper Tube for Bus Construction" is the subject of a catalog issued by the Chase Brass & Copper Company, Waterbury, Conn. Tables list the current-carrying capacities of the various forms—square and round tubes—available. Fittings for these forms are also listed in the illustrated 44-page booklet. In addition, tables of weights and methods of preparing for shipment are given for a line of wire and cable, for both communication and power purposes.

AIR CONDITIONING—ILG Electric Ventilating Company, 2850 North Crawford Avenue, Chicago, Ill., has issued an air conditioning catalog No. 436 and an instruction book No. 436A. The former furnishes specifications and suggested application for its line of self-contained, or remote units, and central systems. The latter offers suggestions on planning, installing, operating and servicing air-conditioning systems. An additional catalog, FB-45, gives complete coverage on its line of blowers and fans, both for ventilating and for air conditioning.

TO "SHOW OFF" *Mother Nature*

BEFORE THOUSANDS OF TEXANS



THE City of Fort Worth installed an extensive flood lighting system to "show off" its beautiful Botanical Gardens at night. American Steel & Wire Company Non-Metallic Triple "L" Trench Cables were selected to supply current for these lights.

These Trench Cables are available in single, twin and multiple conductor constructions and in all sizes for any voltage. The insulation is our Amerite rubber which has low water absorption, perfect aging characteristics, and is in daily operation at voltages up to 13 K. V. Fibrous fillers are eliminated and replaced by an integral sheath and fillers of acid, alkali and water resisting compounds.

AMERICAN STEEL & WIRE COMPANY
208 S. La Salle Street, Chicago
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Columbia Steel Company, San Francisco, *Pacific Coast Distributors.* United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

Don't sign your 1937 contract

For Distribution Transformers

until you consider all these facts:

Pennsylvania Transformers have the basic qualities which insure the MAXIMUM in service, economy and safety, because . . .

1 Coils are *circular*—not rectangular—so that they withstand short circuits without distortion.

2 Coils are of the *open* type, similar to power transformers—instead of the ordinary closed type.

3 Coils are treated in *varnish*—not compound—and therefore will not soften under high temperature nor contaminate oil.

4 Coils, due to open type construction, have a *low temperature gradient* between copper and oil—a feature which permits greater overloads with perfect safety!

5 Coils are treated at a temperature limited to 105°C (the maximum permitted by A.I.E.E.), thus assuring a *permanently safe* and pliable insulation.

6 High-tension and low-tension bushings are bolted from the exterior of case, eliminating necessity for handling tools on inside.

7 The transformer insulation is properly co-ordinated with the flash-over of the bushings, thus providing necessary surge-resisting qualities.

8 The transformer is so designed that radio interference is reduced to a minimum.

These are fundamental improvements which result in transformers of longer life, greater reliability and lower maintenance costs. They are worthy of your careful analysis and consideration before placing your contract for next year's requirements.

PENNSYLVANIA TRANSFORMERS

Pennsylvania Transformer Co.

1701 Island Ave., N. S. **Pittsburgh, Pa.**

Oil Blast Breaker Arcs Photographed

[*Continued from page 43*]

tacts part. Frame 2 shows the first current peak and the hot gas is already pushing through the port opening. Frame 3 shows current zero. The gas bubble on the right is increasing considerably in size, the one on the left is increasing only slightly, due to the hot gas continuing to go out of the port opening. Frame 4 shows the last current peak and frame 5 final current zero and interruption. Here again the hot gas from the left arc is being forced out of the port by the pressure exerted by the right arc, and the collapse of the gas bubble on the left leaves an oil film between the contacts, completing the interruption, and as shown by the change between frames 5 and 6 clean oil is rapidly forcing its way between the contacts and pushing the carbonized oil out of the port opening.

Turbulence indicates oil agitation

The sketch at the top of Fig. 3 shows the test breaker with a conventional arrangement of plain break contacts and the baffles removed. The film résumé shows a test on this breaker at 460 amp., 6,000 volts normal and a recovery rate of 240 volts per microsecond. Frame 1 shows the first current zero, with only slight indication of arcing, frame 2 current maximum, etc., until frame 9, which is the fifth current zero and arc extinction. Frame 10 is a short time after arc extinction. Of particular interest in this series is the amount of agitation and turbulence in the oil, as evidenced by the rapid changes in the shapes of the carbonized oil envelopes surrounding the gas bubbles and the absence of the positively directed oil flow through the arc path shown on the oil blast pictures.

The photographic method of recording data indicates the positive method of interruption in the oil blast designs as against a chance method in the plain-break breaker. It shows the efficiency of the oil blast in carrying away arc products, not only aiding interruption, but increasing the oil insulation between the contacts and preventing possibility of internal flashover. Also, and most important, the photographs record the great speed with which oil movement is initiated and the high rate of increasing size of the oil wedge between the contacts of the oil blast breaker. All of these factors, of extreme importance in the design of commercial oil circuit breakers, cannot be determined by the ordinary oscillograph method of recording interrupting data.

Electric Arc Furnace Economical for Small Heats

[*Continued from page 45*]

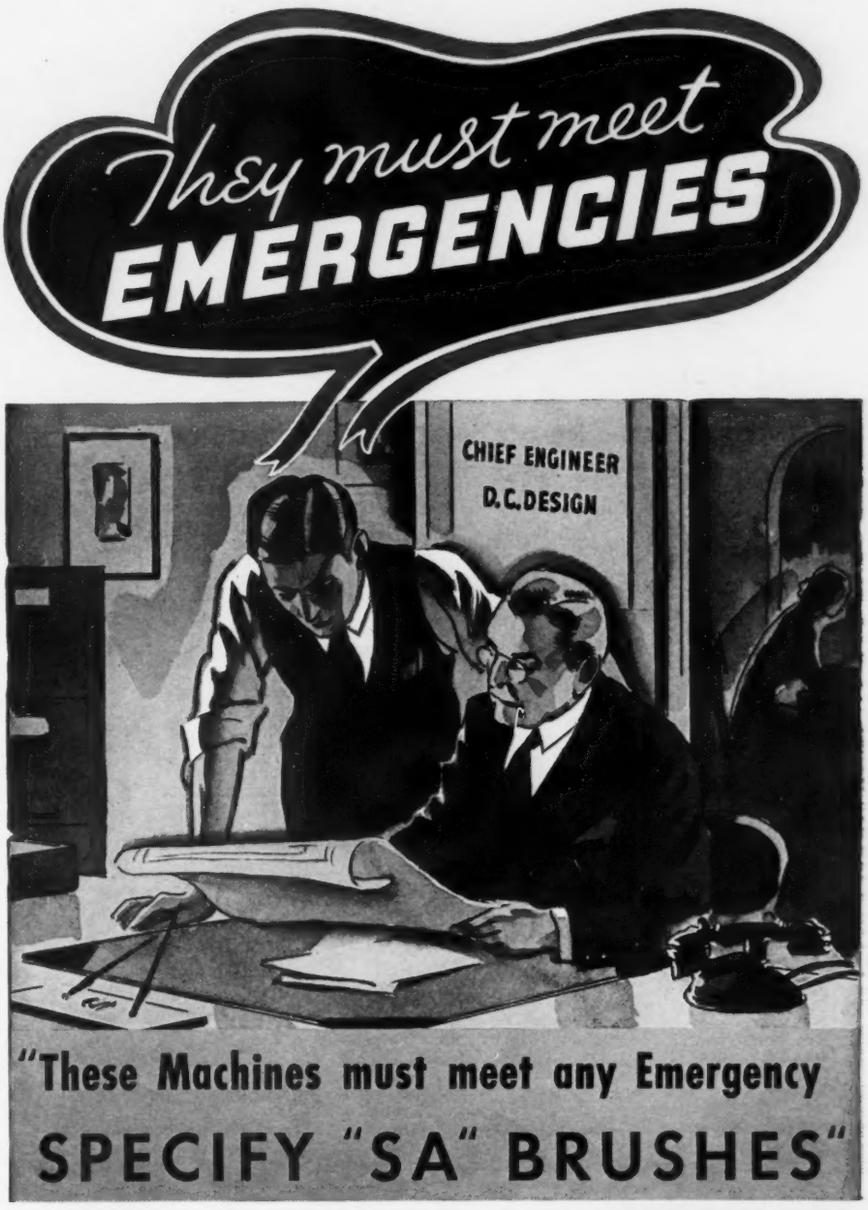
of the melt until such time as the temperature of the furnace chamber nears the danger point for the brick lining and roof. During this period sufficient reaction should be provided to prevent objectionable surges. As soon as the bath is formed and the arc steadied the reactance switch may be changed to a lower tap, the steadiness during the ensuing stage resulting from the resistance of the slag and increased conductivity at the arc vapor. During the later stages of the melting it may be necessary to change the voltage to a lower figure to prevent overheating of the furnace lining. A diagram of a conventional connection is shown herewith.

First leads to a second, larger

The success of the initial installation of the single-phase electric arc furnace soon resulted in the installation of a second and larger furnace of a similar type. Operating economy was obtained by mounting the second furnace adjacent to the first and arranging the electrode control equipment of the latter so that it could be used to control the electrodes of the new furnace. Furthermore, this arrangement permitted using both furnaces for the same demand charge as was made for one, inasmuch as one furnace could not be used when the other was operating.

Installation of the second furnace, based upon successful production of malleable iron in the smaller electric arc furnace, illustrates how this type of equipment extends the use of electric power in the foundry. The production of malleable iron led to the installation of a 50-kw. electric annealing furnace, which has just recently been augmented by a second 50-kw. electric annealing furnace.

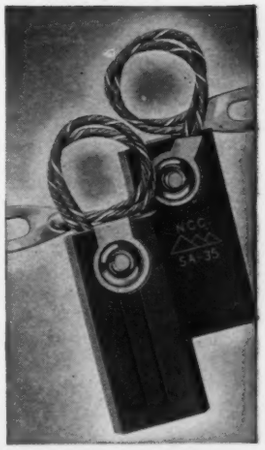
Summarizing the experience derived from this installation, it may be said that the single-phase electric arc furnace permits economies where frequent pours of one-half or one ton of metal is necessary. It permits flexible operation of the foundry and good service for the customer. From the standpoint of the electrical utility a 100-kw. load operating at more than 50 per cent power factor and 80 per cent load factor and suitable for operation on dump power rate should offer an attractive field for cultivation.



"These Machines must meet any Emergency

SPECIFY "SA" BRUSHES"

● Electrical equipment must be designed to meet any emergency—sustained overloads, sudden peaks or heavy mechanical shocks. Modern industry will not put up with failure. The designing engineer carefully considers every element entering into the product he is creating. There must be no weak point. Every part must be capable of meeting the emergencies of heavy duty service. That is the reason designing engineers specify "SA" Series Brushes. That is also the reason operators, who have tried them, specify "SA" Series grades for all equipment in their charge.



●

They have proved for others their ability to meet emergencies. Let them prove it for you!

●

There is a National Pyramid Brush for Every Class of Service

NATIONAL CARBON COMPANY, INC.
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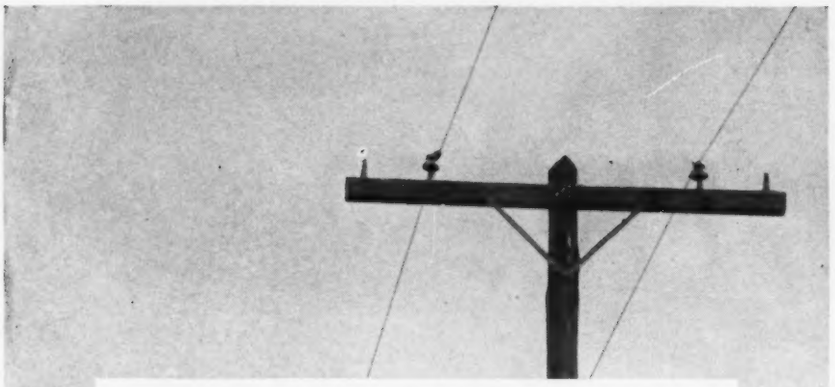

WHERE service is to be made available to rural customers, the profitable operation of the line depends upon adequate permanence in construction and long term economy in maintenance. AmCreCo poles offer strength and durability—far above minimum specification requirements—which assures life exceeding amortization period with minimum maintenance and interruption costs. Let us quote on your requirements.

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ADDRESS INQUIRIES TO CHICAGO, ILL., OR LOUISVILLE, KY.

Spar-Arm Pole Top for T.V.A. 154-Kv. Line

[*Continued from page 47*]

way as on the H-frame structures except that the vertical angles are longer and are fastened with additional bolts to provide greater strength. The natural "V" formed by the tops of the two poles in an A-frame provides a seat for the crossarm and adds to its resistance against displacement under dead-end loads. Construction details are shown in Fig. 5.

In addition to the high shearing strength required at the top of an A-frame, the pole anchorages must resist uplift equal to that on steel towers of comparable size and loading. This requirement was met by notching the poles on either side just above the butt and bolting on two anchor logs, as shown in Fig. 6.

For the attachment of insulator strings the same pole band is used as for other connections. It is drawn tight by a ¾x10-in. double-end bolt bent in the middle to conform approximately to the circumference of the crossarm. A link is inserted around the bolt between the ends of the band for suspending the insulator string.

After all hardware has been firmly bolted in place a ½x4-in. lag bolt is driven through each band into the crossarm to prevent displacement of the bands if they should become loose due to shrinkage of the wood members.

Copper sheet averts digestion of timber

Each pole top is covered with a thin copper sheet, which serves the double purpose of preventing the entrance of water to the heart of the pole at the top and of providing a good metallic conductor between wood members for conduction of leakage currents and for dissipating any heat that may result from the passage of such currents.

Lightning protection is provided by two overhead ground wires supported on separate poles, one on each side of the structures which support the power conductors.

This construction is rugged and simple and a very small number of relatively inexpensive hardware items is required. Mechanical loading to destruction of the wood members has shown no visible distress in the hardware.

Municipal Plants

LODI, CALIF.—City through a unanimous vote by the City Council accepted the $75,000 offer by Pacific Gas & Electric Company to abandon construction of a municipal power plant on the Mokelumne River (ELECTRICAL WORLD, October 10, page 111). Council set November 9 for cancellation of the $466,000 bond issue voted last year for the construction of the plant. Bonds will be canceled on that date unless protest petitions signed by 50 per cent or more of registered voters are filed with the Council by that time.

WALLINGFORD, CONN.—Borough Electric Works has declared a "customers' dividend" equivalent to one-half of the customer's bill for power used in November. The "dividend" amounts to only about $10,000 and would be payable in December. The Wallingford commissioners passed the "dividend" over the opposition of James P. Craig, chairman of the board, who based his objection on the ground that taxpayers of the community raised the original $52,000 employed in starting the municipal system and they as a whole were entitled to the "dividend."

JACKSONVILLE, FLA.—A recently proposed reduction in the commercial lighting rate of the city electric light plant has been formally adopted by the City Commission. Advocated by City Utilities Commissioner Ernest E. Anders, the rate will affect approximately 6,000 consumers of electricity. Mr. Anders estimated that the rate, which will go into effect with December meter readings, would cost the city about $7,000 a month in revenue at the start, but predicted that the losses would be absorbed by the end of next year and a larger consumption would be enjoyed by the plant. He said privately owned utilities are reducing rates everywhere and declared that Jacksonville must get its rate schedule in line with more progressive cities of the country.

ROCKWELL CITY, IOWA—Voters renewed their light and power contract with the Iowa Public Service Company for seven years. The franchise carried by 140 votes in the third election held this year on the power question.

SCRANTON, IOWA—By a vote of 317 against and only 40 in favor, citizens decided recently that they did not want a municipal electric light plant. The company was victorious also in the town of Carroll, where it was granted a 25-year manufactured gas franchise by a vote of 498 to 186.

LOUISA, KY.—City Council has refused to rescind an ordinance providing for a popular vote on the question of issuing bonds for $92,000 for building a municipal electric plant (October 10, page 112).

READING, MASS.—City light plant has filed a reduction of 5 mills per kilowatt-hour with the Massachusetts Department of Public Utilities for domestic customers' usage above 200 kw.-hr. per month, bringing the minimum rate to 1.5 cents. Cut was effective November 1.

MIDDLEBORO, MASS.—City Lighting Department has notified the Massachusetts Department of Public Utilities of a cut from $1 to 50 cents per horsepower of connected load per month in its minimum charge. Cut was effective November 1.

BAY CITY, MICH.—City's municipal power problem was thrust to the front after the City Commission had been advised recently that a three-unit generating plant can be built for $800,000. The information was

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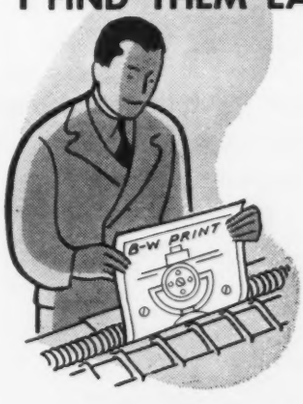
"I FIND THEM EASIER TO CHECK"

"I'm through with hunting around for 'lost' notations on blue prints! Now we use BW Prints—and every change or correction stands out like a tower on a hill. BW Prints certainly help me do a better job of checking—and they prevent mistakes that might run into considerable money."

"I FIND THEM EASIER TO MAKE"

B W



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Do you know that L&G PREPAYMENT METERS are available for A-N-Y rate

. . . and for any coin as well as any number of coins.

The Landis & Gyr Prepayment Meter (Type CF 4 k) has many other exclusive advantages:

The simplest prepayment meter ever devised and the smallest, permitting mounting in most present meter spaces.

The element, through modern compensating features, meets today's requirements of accuracy on extreme overload.

The coin mechanism, convenient to operate, holds up to 99 coins in advance.

The dials indicating total coins, KWh as well as coins unused are easily read by customer and utility. Write for details.

LANDIS & GYR—104 Fifth Ave., N. Y.

Yesterday

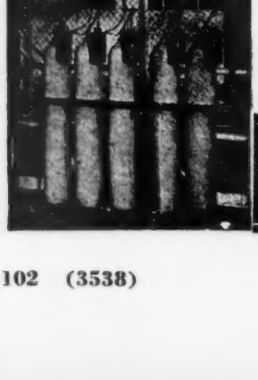
FIRES TAXED MAN POWER TO LIMITS OF ENDURANCE

An old-time fire in New York meant a strenuous time for the fire-fighters. Other interesting illustrations, taken from old prints, will appear in advertising of LUX Fire Protection in future issues of this publication.

Today

FIRES ARE EXTINGUISHED WITHOUT HUMAN HANDS

Protection for generators, transformers, oil switches, etc., is furnished by this typical LUX installation.



● Consider the advantages of Lux automatic fire system as described by a large utility.

A southern substation burned to the ground—Town without power for three days. Rebuilt and Lux equipped—Struck by lightning—while unattended, causing fire in instrument transformer and oil switch, yet report shows that not a light went out and repair bill negligible.

Let Lux engineers survey your power plants and submit concrete recommendations.

Walter Kidde & Company, Bloomfield, N. J.

MORE THAN 4,000,000 H. P. IS LUX PROTECTED

presented by Ayres, Lewis, Norris & May, engineers, of Ann Arbor. The city light department now buys energy wholesale from the Consumers Power Company and retails it in competition with the utility. A similar survey made in 1931 estimated the cost of a generating plant at $1,100,000 and the voters subsequently rejected a proposal to erect a plant.

LUDINGTON, MICH.—Voters have turned down a proposal to bond the city for $450,000 to build a municipal electric light plant. Vote stood at 670 against and 615 for the plan.

BEATRICE, NEB.—In a special election voters recently defeated a proposal to grant the Gage County Electric Company a fifteen-year franchise. The plan would have reduced the wholesale rates, but city commissioners said the reduction would not have been sufficient to warrant decreased retail rates. City officials also refused to give their approval on the ground that the contract covered too long a time. They are expecting to buy power from one of the several hydro-electric plants after they begin operations.

MYERSTOWN, PA.—The right of municipalities to compete with private electric companies was attacked and defended in the Pennsylvania Superior Court recently. Attacking competition was the Metropolitan Edison Company and defending it was counsel for the Public Service Commission. The case arose over the certificate granted by the commission last January to the Borough of Myerstown to construct an electric plant and distributing system. Metropolitan already serves the borough. Erection of the plant was approved by 612 voters out of a total of 822. A bond issue of $125,000 was authorized. David I. McCall of Pittsburgh, counsel for Metropolitan Edison, attacked the order of the commission as unjustifiable. He contended that, in conflict with Public Service law, the order was issued for the certificate when there was no evidence that construction of the municipal plant is necessary. At the conclusion of the argument the Superior Court took the case under advisement.

WISCONSIN—Declaring that it makes "an unlawful delegation of legislative power" to the Wisconsin Public Service Commission in the provision that the commission shall pass upon the district if at a referendum some of the municipalities originally proposed to be parts of it vote not to become part of the district, Circuit Judge A. C. Hoppmann has issued at Madison his formal decision in the Polk-Burnett power district case. The commission, whose approval of the district was appealed in Dane County Circuit Court by the Clam River Electric Company, one of the utilities in the district, will appeal the decision to the state Supreme Court. Since the Polk-Burnett power district is the first to be created under the 1931 power district law, the law will face its first constitutional test when it is carried to the high court. Judge Hoppmann held the law unconstitutional and the district void.

DE LAND, FLA.—City Commissioners have called a special election for November 17 to allow freeholders to vote upon the issuance of $398,000 electric revenue certificates to finance the cost of constructing a municipal light plant and distribution system. P.W.A. has offered to buy the certificates which are to be paid out of revenue of the plant.

SANDPOINT, IDAHO—City Council has voted for the issuance of $50,000 in bonds to begin work on its municipal power

project. The project includes the erection of a hydro-electric plant on Priest River. The action of council follows the authorization of $300,000 in bonds for the project at a recent election. It is expected that with P.W.A. help, only $150,000 will have to be spent by the city.

•

Recent Rate Changes

DETROIT EDISON COMPANY has been ordered by the Michigan Public Utilities Commission to reduce its rates and charges approximately $1,711,000 annually. Alex Dow, president of Detroit Edison, said his company will accept the ruling. The commission order substitutes a simplified "block" rate system for the company's present policy of charging customers on the number of rooms in their homes. The largest portion of the reduction is made by reducing rates to residential subscribers. The new rate, applying to nearly all of the Detroit Edison company's 600,000 customers in the eastern part of Michigan was made effective on October 1 on all bills rendered after November 1. William M. Smith, commission chairman, estimated the reduction in residential rates at $937,000 annually, reduction on special rates $628,000, street lighting rates $140,000 and miscellaneous rates $6,000.

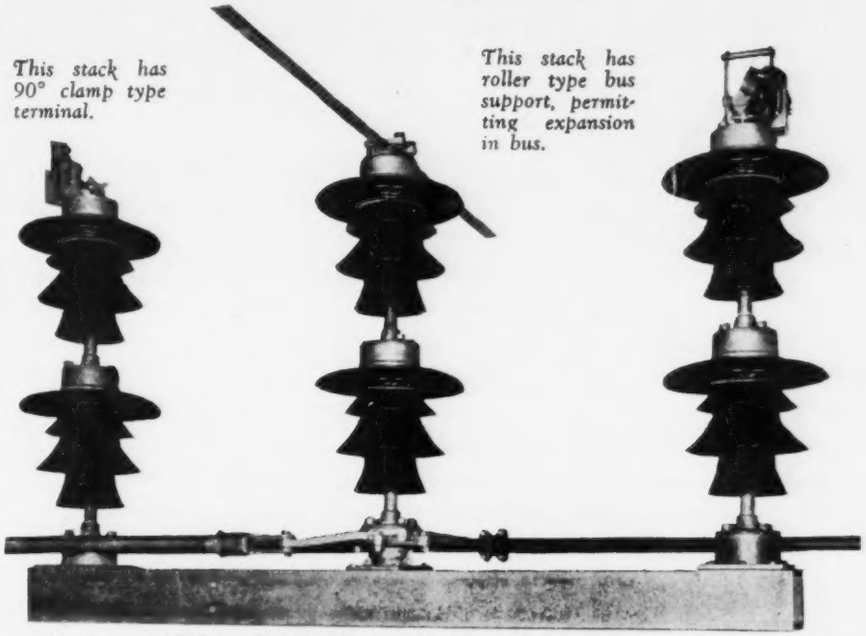
DUKE POWER COMPANY has reduced its rates for electricity and gas in the Carolinas $1,100,000 due to good business and the indications of its continuing, company officials announced last week. At the same time Commissioner Stanley Winborne of the North Carolina Utilities Commission and Chairman James W. Wolfe of South Carolina Public Service Commission, issued announcements giving the new reduced rates. This is the second cut by Duke Power this year.

EDISON LIGHT & POWER COMPANY'S offer to make an annual rate reduction of $165,000 and place its rates on the sliding scale basis at the end of next year has been refused by the Pennsylvania Public Service Commission. The offer was contingent on the Commission dropping its case against the York utility, and was the first sliding scale offer made to the commission. The commission's refusal was based on the fact that the company's proposed cut would, on the basis of its own statements, leave it earning in excess of 8 per cent return, and the sliding scale with the rate base proposed by the company would guarantee a return in excess of 8 per cent. The commission has ruled that 6 per cent return is sufficient.

NEWPORT (R. I.) ELECTRIC CORPORATION has filed a new schedule eliminating the room rate, cutting domestic rates by $23,000 a year and small power rates by $7,830 with the state division of public utilities. Chief Frederick A. Young of the division stated that these and other recent cuts have been voluntary, following conferences. The minimum charge drops from $2 to $1.50 in a new single meter lighting and appliance domestic rate, and allows the use of 11 kw.-hr. at no additional charge, plus further reductions to a minimum of 3 cents for all over 125 kw.-hr. per month. A yearly residence lighting rate also has been reduced.

UTAH POWER & LIGHT COMPANY will come in for intensive study and discussion at a public hearing on its rate schedules before the state Public Service Commission on November 23. A month ago the commission ordered a reduction on some of the utility's rates, an order with which the com-

Another ELPECO *High Quality Product*



600 Amp. 110KV Single Pole of a 3-pole Elpeco Gang Operated Type DB-SO Disconnecting Switch . . . open position.

Particularly adapted to isolate apparatus for inspection and repair; or as a transfer switch for circuit connection changes. Also used as a by-pass switch.

Switches of 23KV and lower voltages are equipped with babbitted type bearings Alemite fitted. Above 23KV switches have dry type roller bearings.

Contacts are of the full floating medium pressure self-aligning type and are silvered.

See Section No. 3600 of our new catalog No. 36 for full details of construction of this sturdy switch.

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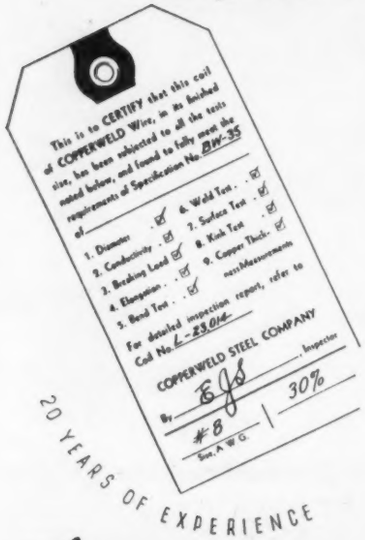
This is to CERTIFY that this coil of COPPERWELD Wire, in its finished size, has been subjected to all the tests noted below, and found to fully meet the requirements of Specification No. BW-35
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20 YEARS OF EXPERIENCE

This TAG of CERTIFICATION appears on every coil of "COPPERWELD" WIRE and STRAND

Nine rigid tests, that the finished wire must pass before shipment or stranding, make certain that it meets exacting specifications. These, together with the many tests of raw materials and of those in process, maintain the high quality of Copperweld products.

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COPPERWELD STEEL COMPANY
GLASSPORT . . . . PA.

pany complied. The hearing on November 23 will delve more deeply into the business of the company on matters of rates, practices, schedules and the like.

VIRGINIA EAST COAST UTILITIES has reduced its electric rates for domestic and commercial customers approximately $16,000 a year, according to an announcement made by the Virginia Corporation Commission. The reductions took effect November 1 for all consumptions after the October, 1936, meter readings. The commission's order reduces the present top steps in all domestic rates and in the commercial lighting rate from 12½ to 12 cents per kilowatt-hour. Effective at each fourth month after November 1 of this year, these top steps will be reduced further at the rate of ½ cent per kilowatt-hour until they get down to 10 cents per kilowatt-hour.

FLORIDA POWER & LIGHT COMPANY has lost its suit against the city of Miami over electricity rates. Judge W. H. Barrett of United States District Court, Atlanta, has decided against the utility in its suit to restrain the city from enforcing electricity rate reductions averaging 30 per cent. Will M. Preston, acting head of the legal department for the company in Miami, said: "The company has no alternative but to appeal such decision to the Circuit Court of Appeals in New Orleans."

EDISON ELECTRIC ILLUMINATING COMPANY of Boston has made a reduction to 1,300 large users of electricity in a new schedule of rates for general lighting purposes filed with the Massachusetts Department of Public Utilities, effective November 1. The new rate consists of a modification of the third block of the rate by changing it from 8,600 kw.-hr. to a variable number based upon the demand of the consumer. The Edison company declared it is not possible to estimate accurately the effect of the change until the schedule has been in operation for some time, but believed that customers who used more than 1,350 kw. hr. per month will receive a reduction of approximately 7 per cent on their present use.

WISCONSIN GAS & ELECTRIC COMPANY has announced a reduction in electric rates effective after the November meter readings which will mean an annual saving of $49,800 to patrons in the utility's southeastern area of Wisconsin. The reduction which the Wisconsin Public Service Commission authorized, will be divided equally between residential customers and store and office users.

DAYTON POWER & LIGHT COMPANY has presented to the City Commission a proposal for the lowering of residential electric rates in this city, the new schedule being the outcome of a survey conducted for the past several months. Under the new plan the minimum rate would be boosted from 50 to 60 cents, although other rates would be lower. Present rates are 5½ cents for the first 30 kw-hr., 5 cents for the next 50 and 2¾ cents for consumption in excess of 80 kw.-hr. The new schedule proposed is 60 cents for the first 10 kw-hr., 5 cents for the next 30, 4½ cents for the next 50 and all over 90 would be 2¾ cents. The City Commission took no action in the matter, receiving the proposal for study.

WESTERN PUBLIC SERVICE COMPANY has announced a reduction in residential, farm and commercial lighting rates, effective November 1, throughout its Wyoming, Nebraska and Colorado districts. W. M. Bird, president of the company, estimated the savings to consumers would aggregate $80,000 annually.

SALES OPPORTUNITIES IN NEW CONSTRUCTION

MAYSVILLE, KY.—Kentucky Power & Light Company, Augusta, Ky., plans extensions and improvements in power plant at Maysville, including installation of new 2,500-kw. turbo-generator unit and auxiliary equipment. Project has been approved by State Public Service Commission.

KINGFISHER, OKLA.—Consumers' Rural Power Company, recently organized, plans rural electrification project in Kingfisher, Logan, Major, Blaine and other counties, totaling about 750 miles of transmission and distributing lines, with power substation and service facilities. Initial construction will comprise section of about 300 miles, for which federal fund of $300,000 has been secured.

PHILADELPHIA, PA.—Bureau of Supplies and Accounts, Navy Department, Washington, D. C., receives bids until November 10 for ten 750-kva. transformers, three 150-kva. and three 75-kva. transformers, for Philadelphia Navy Yard (Schedule 9178); also for four power switchboards (Schedule 9151).

TRENTON, N. J.—L. A. Young Spring & Wire Corporation, 9200 Russell Avenue, Detroit, Mich., plans installation of motors and controls, conveyors, electric hoists and other equipment in new Eastern branch plant on 10-acre tract of land on East State Street Extension, recently purchased, for steel spring and wire goods manufacture. Cost over $400,000.

NORTHFIELD, MINN.—Board of Trustees, St. Olaf College, will take bids soon for addition to power plant at institution, including installation of new equipment. Cost about $125,000. Charles Hodgdon, 111 West Monroe Street, Chicago, Ill., is architect.

EL CENTRO, CALIF.—Imperial Irrigation District, M. J. Dowd, chief engineer, plans transmission and distributing lines for rural electrification in parts of Imperial Valley district, totaling over 500 miles, with power substation and service facilities. Fund of $700,000 is being secured through federal aid. Special election will be held soon to approve project.

DENVER, COLO.—Bureau of Reclamation, Denver, receives bids until November 30 for one 3000-amp., 23,000-volt bus structure with potential transformers and generator lightning arresters and capacitors, and one neutral grounding reactor with cubicle, and two 23,000-volt, 4,000-amp., vertical lift-type oil circuit breakers for Boulder power plant, Boulder Canyon Project, Arizona-California-Nevada (Specifications 703).

NEW BRITAIN, CONN.—Stanley Works, Inc., plans installation of heavy duty motors and controls, regulators, conveyors, electric hoists and other equipment in one-story addition to rolling mill at steel products manufacturing plant, 75x275 ft. Cost over $100,000.

GALVESTON, TEX.—Houston Lighting & Power Company, Houston, Tex., Galveston Division, plans extensions in transmission lines in vicinity of Galveston Island, about 17 miles in all.

TOLEDO, OHIO—Plans large electric-operated pumping station in connection with waterworks extensions, with installation of three motor-driven centrifugal pumping units and accessories with gross capacity of 25,000,000 gal. per day, switchboard panels, control instruments and auxiliary electrical

equipment. Entire project will cost about $686,800, of which about one-half will be secured through federal grant.

WASHINGTON, D. C.—Bureau of Supplies and Accounts, Navy Department, Washington, receives bids until November 10 for quantity of electric cable for Eastern and Western Navy Yards (Schedule 9135).

WILLOW SPRINGS, WIS.—Wisconsin Power & Light Company, Madison, plans extensions in transmission lines for rural electrification in part of Lafayette County, with power substation facilities and distributing lines at Willow Springs, Kendall and vicinity.

LOS ANGELES, CALIF.—California Electric Steel Mills, Inc., recently organized, care of A. C. Denman, 407 Van Nuys Building, representative in charge, plans installation of generator set, heavy-duty motors and controls, regulators, conveyors and other equipment in new electric-operated steel rolling mill at Watts, near Los Angeles, where site has been acquired. Cost over $100,000.

PLYMOUTH, IND.—Marshall County Rural Electrification Membership Corporation, recently organized, plans rural electrification project in parts of Marshall County, totaling about 180 miles of transmission and distributing lines, with power substation and service facilities. Fund of $185,000 has been secured through federal aid. This is the first section of a total of 372 miles of lines to be constructed.

KNOXVILLE, TENN.—Director of Purchases, Tennessee Valley Authority, Knoxville, receives bids until November 12 for four single-phase, 60-cycle, self-cooled, 3,333-kva., outdoor transformers with accessories, 63,582/110,000-volt wye to 26,600/46,000-volt wye; units to have a 12,450-volt delta full capacity tertiary, for Jackson primary substation; until November 17 for one 300-ton electric overhead traveling crane for power house at Pickwick Landing Dam.

BATTLE CREEK, MICH.—Kellogg Company plans installation of motors and controls, conveyors and other equipment in new multi-story additions to cereal products mills. Cost close to $400,000. Albert Kahn, Inc., New Center Building, Detroit, Mich., is architect and engineer.

NORTHFIELD, MINN.—Has surveys under way for a municipal electric power plant and system. Estimated cost close to $250,000. Municipal Construction & Finance Company, Lincoln, Neb., is consulting engineer for surveys and report.

OCONTO, WIS.—Oconto County Electric Co-operative Association, Oconto, recently organized, has plans maturing for rural electrification project in parts of Oconto and Marinette Counties, totaling about 300 miles of primary and secondary lines, with power substation and service facilities. Fund of $290,000 has been secured through federal aid. E. B. Wayte, Capitol Building, Madison, Wis., chief engineer, Wisconsin R.E.A. is in charge.

DES MOINES, IOWA—Iowa Packing Company, East Eighteenth Street, plans installation of motors and controls, conveyors, loaders and other equipment in new addition to meat-packing plant. Cost close to $400,000. Company is affiliated with Swift & Company, Union Stock Yards, Chicago, Ill.

BEREA, OHIO—Plans extensions and improvements in municipal electric power plant, including installation of additional equipment.

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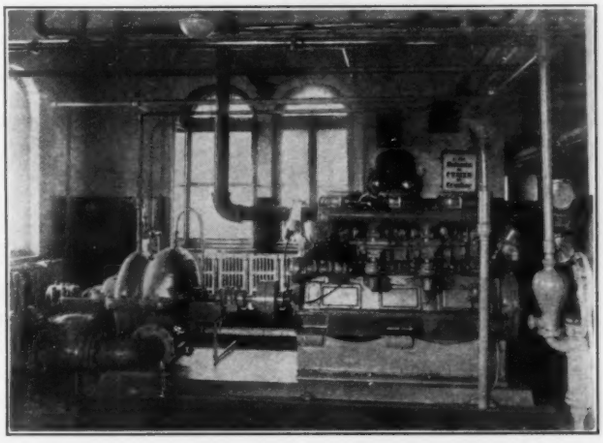

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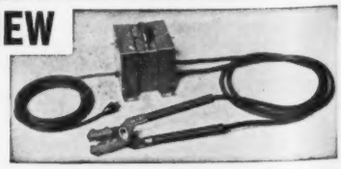

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